

SOLUTION TO INSOMNIA: A REVIEW

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ABSTRACT

Today's world is full of competition and mental stress is a common problem among the people of all ages. And to get relief from mental stress sleeping is the only natural medicine that every person wants to get at the end of the day. What would happen if we spend the whole night wandering here and there in our room? This lead to the daytime sleepiness and lack of energy during the whole day. It can also make one feel anxious, depressed or irritable. This is the condition of insomnia. A survey by "Will Oberndorf" recorded that 95% of people admitted that they have had insomnia and he discussed the details in his article "Everything you want to know about Insomnia "[1]. This survey included people of all ages, and led to the discovery that many adolescents and children complain about sleeping problems. Insomnia is a risk factor for impaired function, development of other medical and mental disorders, and increased health care costs. Sleep disruption appears to be associated with altered pain processing and central sensitization, according to new research by American Pain Society [2]. Some, over the counter products that contain antihistamines are sold as sleep aids globally. Although these products might make you sleepy but they may have long term adverse effect which include daytime drowsiness, dry mouth and dizziness. In recent time researchers are trying to solve this problem of insomnia by natural methods like changes in life styles and electromagnetic field therapy. In this paper a review is presented to explain the types of insomnia, diagnosis, treatments and some new researches in the same field. In treatment, main focus is on the Cognitive Behavioral Therapy and basics of Electronic Sleep Inducer.

Keywords: *Insomnia, Antihistamine, Cognitive Behavioral Therapy, Electronic Sleep Inducer*

I. INTRODUCTION

Human spend approximately one third of their lives in sleeping. But what happen when we spend our whole night or a portion of it in trying to sleep. This affects our health as it causes daytime sleepiness and lack of energy. It can also make you feel anxious, depressed or irritable. You may have trouble focusing on tasks, paying attention, learning and remembering. These problems can prevent you from doing your best at work or school.

Insomnia is such a condition in which people have trouble in falling asleep, staying asleep, or both. As a result, they may get too little sleep or have poor quality sleep. They may not feel refreshed when they wake up.

Insomnia is not a disease. It is a symptom for severe medical and psychiatric disorders. It is not defined based purely on the number of sleep hours, since each individual has different sleeping patterns. While most people have had difficulty in initiating sleep and have experienced the downside of having a sleepless night, few people look for medical advice.

Sleep is a state (or complex behavior), different from wakefulness, with which it is closely related, with both expressing different types of brain activity. The two states are integrated into a functional unit known as the *sleep-wake cycle*, whose periodic onset is circadian and a result of the interaction of different areas at the brainstem, diencephalon and cerebral cortex.

There are **two** distinct types of sleep: **REM (Rapid Eye Movement)** or **paradoxical sleep** and **slow wave sleep**, known as **Non-REM sleep (Non-Rapid Eye Movement)**. REM or paradoxical sleep is associated with high neuronal activity and dreams. REM sleep actively converts waking experiences into lasting memories and abilities in young brains, reports a new study from Washington State University[3]. Slow-wave sleep is frequently called “dreamless sleep,” dreams and sometimes even nightmares do occur during slow-wave sleep. The difference between the dreams that occur in slow-wave sleep and those that occur in REM sleep is that those of REM sleep are associated with more bodily muscle activity, and the dreams of slow-wave sleep usually are not remembered [4]. Non-REM dreams tend to resemble wakeful thinking (perhaps pondering a wakeful event, or a REM dream which has occurred), and they are generally less emotional, outlandish, lengthy, dramatic, visual, and active. When people are awakened from non-REM dreams, they might say that they weren't asleep at all, but were awake and thinking; this is the error made by some people who claim to be insomniacs, although sleep-lab equipment proves that they were sleeping. In one occasion when recalled the non-REM state, noted that "the thoughts were the same as ordinary daytime thoughts, and they concerned regular subjects. It was just an ordinary 'mulling over' [5].

Non-REM sleep can be subdivided into four stages:

Stage 1 is the shortest and corresponds to the lightest sleep stage.

Stage 2 consists of more than 50% of the total asleep.

Stages 3 and 4 correspond to so-called delta sleep, which is the deepest and most restorative sleep. Night time sleep alternates between Non-REM and REM sleep in cycles (4-6 times). At the beginning of the night, delta sleep predominates, and occupies less time as sleep progresses, while the duration of REM sleep periods increase in subsequent cycles. When there are problems with sleep, and these exceed certain intensity or the adaptive capacity of the person, they become pathological, and cause significant discomfort with symptoms that affect the physical realm, as well as the psychological and behavioral.

II. TYPES OF INSOMNIA

Primary insomnia is sleeplessness that cannot be attributed to an existing medical, psychiatric or environmental cause.

Secondary insomnia is when symptoms of insomnia arise from a primary medical illness, mental disorders or other sleep disorders. It may also arise from the use, abuse or exposure to certain substances.

Insomnia can be classified as a sleeping disorder that lasts for less than a week is known as **transient insomnia**.

Short-term insomnia, on the other hand, is a symptom that lasts for three weeks; and a **chronic insomnia** lasts more than three weeks. This disorder can happen to all age groups.

Insomnia classified according to the patterns is as follows [6]:

Initial insomnia: early- morning awakening.

Middle insomnia: difficulty in sleeping through the night without waking up and difficulty in going back to sleep.

Terminal insomnia: difficulty in falling asleep.

The *International Classification of Sleep Disorders, 2nd Edition*, documents the following types of insomnia [7]: **Adjustment insomnia:** This is also called acute insomnia or short-term insomnia. It is usually caused by a source of stress and tends to last for only a few days or weeks. Epidemiologic studies indicate that the one-year prevalence of adjustment insomnia among adults is likely to be in the range of 15-20%. Adjustment insomnia can occur at any age, although establishing a relationship between a particular stress and sleep disturbance may be difficult in infants. Adjustment insomnia is more common in women than men and in older adults than younger adults and children. **Behavioral insomnia of childhood:** Two primary types of insomnia affect children. *Sleep-onset association type* occurs when a child associates falling asleep with an action (being held or rocked), object (bottle) or setting (parents' bed), and is unable to fall asleep if separated from that association. *Limit-setting type* occurs when a child stalls and refuses to go to sleep in the absence of strictly enforced bedtime limits. Approximately 10-30% of children are affected by this condition. **Idiopathic insomnia:** An insomnia that begins in childhood and is lifelong, it cannot be explained by other causes. Information suggests that this condition is present in approximately. 7% of adolescents and 1.0% of very young adults.

Inadequate sleep hygiene: This form of insomnia is caused by bad sleep habits that keep you awake or bring disorder to your sleep schedule. This condition is present in 1-2% of adolescents and young adults. This condition affected 5-10% of sleep clinic population.

Insomnia due to drug or substance, medical condition, or mental disorder: Symptoms of insomnia often result from one of these causes. Insomnia is associated more often with a psychiatric disorder, such as depression, than with any other medical condition. Surveys suggest approximately 3% of the population has insomnia symptoms that are caused by a medical or psychiatric condition. Among adolescents and young adults, the prevalence of this form of insomnia is slightly lower. 2% of the general population is affected by this type of insomnia. Approximately 3.5% of all sleep-center patients are affected by this condition.

Paradoxical insomnia: A complaint of severe insomnia occurs even though there is no objective evidence of a sleep disturbance. The prevalence in the general population is not known. Among clinical populations, this condition is typically found in less than 5% of patients with insomnia. It is thought to be most common in young and middle-aged adults.

Psychophysiological insomnia: A complaint of insomnia occurs along with an excessive amount of anxiety and worry regarding sleep and sleeplessness. This condition is found in 1-2% of the general population and 12-15% of all patients seen at sleep centers. It is more frequent in women than in men. It rarely occurs in young children but is more common in adolescents and all adult age groups.

III. CAUSES AND SYMPTOMS OF INSOMNIA

Symptoms of insomnia are as follows [6]

Night-time Symptoms:

1. Frequent difficulty falling asleep.



2. Frequent episodes of waking up accompanied by difficulty in falling back to sleep.

3. Waking up too early in the morning with inability to fall back to sleep again.

4. Non refreshing night time sleep.

Day-time Symptoms [6]:

1. Fatigue

4. Depression

2. Memory of attention impairment

5. Sleepiness

3. Anxiety and irritability

Symptoms of insomnia can be caused by or can be comorbid with:

Symptoms of insomnia can be caused by

1. Use of fluoroquinolone antibiotic drugs, see fluoroquinolone toxicity, associated with more severe and chronic types of insomnia.

2. Restless Legs Syndrome, which can cause sleep onset insomnia due to the discomforting sensations felt and the need to move the legs or other body parts to relieve these sensations.

3. Life events such as fear, stress, anxiety, emotional or mental tension, work problems, financial stress, birth of a child and bereavement.

4. Disturbances of the circadian rhythm, such as shift work and jet lag, can cause an inability to sleep at some times of the day and excessive sleepiness at other times of the day. Chronic circadian rhythm disorders are characterized by similar symptoms.

5. Abuse of over-the counter or prescription sleep aids (sedative or depressant drugs) can produce rebound insomnia.

6. For people in the early phases of recovery from alcohol addiction, insomnia is a “prevalent and persistent” problem, says a study [8].

7. Stress may trigger insomnia, but those with a lower amount of a particular pattern (spindles) of brain waves are at even greater risk of developing the disorder, research has found [9].

IV. PREVALENCE

According to The American Academy of Sleep Medicine -2008[7]:

About 30 percent of adults have symptoms of insomnia

About 10 percent of adults have insomnia that is severe enough to cause daytime consequences.

Less than 10 percent of adults are likely to have chronic insomnia.

A survey in December 1995 administrated by the Gallup Poll organization found that 48% of all adults in the U.S. have had problems with insomnia [1]. Of these 48%, 25% had chronic or severe insomnia, in which an individual has trouble sleeping almost every night. Another survey reflected that only 35% of the adults in the United States have insomnia [1]. From these surveys, chronic insomnia was found more in *middle-aged and older adults* and is more prevalent in *females* [1].

People, who have a *medical or psychiatric illness*, including *depression*, are at risk for insomnia.

People who use *medications* may experience insomnia as a side-effect.



V. DIAGNOSIS

Doctor will likely diagnose insomnia based on patients medical and sleep histories and a physical exam. He or she also may recommend a sleep study. For example, patient has a sleep study if the cause of your insomnia is unclear.

VI. TREATMENT

You should seek help if your insomnia has become a pattern, or if you often feel fatigued or unrefreshed during the day and it interferes with your daily life. Many people have brief periods of difficulty sleeping (for example, a few days after starting a new job), but if insomnia lasts longer or has become a regular occurrence, you should ask for help.

6.1 Lifestyle Changes [30]

Lifestyle changes often can help relieve acute (short-term) insomnia. These changes might make it easier to fall asleep and stay asleep, such as:

- **Caffeine, tobacco, and other stimulants.** The effects of these substances can last as long as 8 hours.
- **Certain over-the-counter and prescription medicines** that can disrupt sleep (for example, some cold and allergy medicines). Talk with your doctor about which medicines won't disrupt your sleep.
- **Alcohol.** An alcoholic drink before bedtime might make it easier for you to fall asleep. However, alcohol triggers sleep that tends to be lighter than normal. This makes it more likely that you will wake up during the night. A study found that who drink before sleeping ,alcohol initially acts as a sedative –marked by delta frequency EEG –but is later associated with sleep disruption by increase in alpha power in brain[33].
- Try to adopt bedtime habits that make it easier to fall asleep and stay asleep. Follow a routine that helps you wind down and relax before bed. For example, read a book, listen to soothing music, or take a hot bath.
- Try to schedule your daily exercise at least 5 to 6 hours before going to bed. Don't eat heavy meals or drink a lot before bedtime.
- Make your bedroom sleep-friendly. Avoid bright lighting while winding down. Try to limit possible distractions, such as a TV, computer, or pet. Make sure the temperature of your bedroom is cool and comfortable. Your bedroom also should be dark and quiet.
- Go to sleep around the same time each night and wake up around the same time each morning, even on weekends. If you can, avoid night shifts, alternating schedules, or other things that may disrupt your sleep schedule.
- Now researchers report that taking a nap may be an effective strategy to counteract impulsive behavior and to boost tolerance for frustration caused due to insomnia [11].
- Yoga asana and breathing exercises can help address the problem of insomnia at the physiological and psychological level. Six soothing yoga posses:
Sputa Matsyendrasana, Adho Mukha Svanasana, Salamba Sirsasana, Shishuasana, Diaphragmatic breathing, Nadi Shodhan Pranayama [11].

Non-Medical (Cognitive & Behavioral) Treatments for Insomnia [34]

There are psychological and behavioral techniques that can be helpful for treating insomnia. Relaxation training, stimulus control, sleep restriction, and cognitive behavioral therapy are some examples. Some of these techniques can be self-taught, while for others it's better to enlist the help of a therapist or sleep specialist.

Relaxation training, or progressive muscle relaxation, teaches the person to systematically tense and relax muscles in different areas of the body. This helps to calm the body and induce sleep. Other relaxation techniques that help many people sleep involve **breathing exercises**, **mindfulness**, **meditation techniques**, and **guided imagery**. Many people listen to audio recordings to guide them in learning these techniques. They can work to help you fall asleep and also return to sleep in the middle of the night.

Cognitive behavioral therapy (CBT) [31] includes behavioral changes but it adds a cognitive or "thinking" component. CBT works to challenge unhealthy beliefs and fears around sleep and teach rational, positive thinking. There is a good amount of research supporting the use of CBT for insomnia. For example, in one study, patients with insomnia attended one CBT session via the internet per week for 6 weeks. After the treatment, these people had improved sleep quality. CBT has five main components:

Sleep hygiene - the dos and don'ts of sleep management.

Sleep restriction - increasing night-time sleepiness by limiting other opportunities to sleep.

Stimulus control - reducing time spent in bed awake.

Cognitive therapy - controlling pre-sleep thoughts.

Relaxation - physical strategies.

CBT can be effectively delivered by appropriately trained members of the primary care team. CBT for insomnia targets the thoughts and actions that can disrupt sleep. This therapy encourages good sleep habits and uses several methods to relieve sleep anxiety. For example, relaxation techniques and biofeedback are used to reduce anxiety [30]. Several clinical trials have shown that CBT provides as good or better relief of symptoms of insomnia than prescription drugs, with improvements in sleep that are more durable [12]. These strategies help you better control your breathing, heart rate, muscles, and mood. CBT also aims to replace sleep anxiety with more positive thinking that links being in bed with being asleep. This method also teaches you what to do if you're unable to fall asleep within a reasonable time. CBT also may involve talking with a therapist one-on-one or in group sessions to help you consider your thoughts and feelings about sleep. This method may encourage you to describe thoughts racing through your mind in terms of how they look, feel, and sound. The goal is for your mind to settle down and stop racing. CBT also focuses on limiting the time you spend in bed while awake. This method involves setting a sleep schedule. At first, you will limit your total time in bed to the typical short length of time you're usually asleep. This schedule might make you even more tired because some of the allotted time in bed will be taken up by problems falling asleep. However, the resulting tiredness is intended to help you get to sleep more quickly. Over time, the length of time spent in bed is increased until you get a full night of sleep. For success with CBT, you may need to see a therapist who is skilled in this approach weekly over 2 to 3 months. CBT works as well as prescription medicine for many people who have chronic insomnia. It also may provide better long-term relief than medicine alone. For people who have insomnia and major depressive disorder, CBT combined with antidepressant medicines has shown promise in relieving both conditions. CBT is widely used non pharmacologic treatment for insomnia disorders



and an analysis of the medical literature it can also work for patients whose insomnia is coupled with psychiatric and medical condition according to study [32].

Compared with those who didn't received CBT ,patients who did increased the time asleep in bed by about 12 percentage points ,fell asleep about 25 minutes faster and decreased the amount of time awake in the middle of the night by about 45 minutes ,according to Jade Wu,lead study author and a Boston University doctoral student in psychology[12].

6.2 Medicines

6.2.1 Prescription Medicines [30]

Many prescription medicines are used to treat insomnia. Some are meant for short-term use, while others are meant for longer use. Talk to your doctor about the benefits and side effects of insomnia medicines. For example, insomnia medicines can help you fall asleep, but you may feel groggy in the morning after taking them. Rare side effects of these medicines include sleep eating, sleep walking, or driving while asleep. If you have side effects from an insomnia medicine, or if it doesn't work well, tell your doctor. He or she might prescribe a different medicine. Some insomnia medicines can be habit forming. Ask your doctor about the benefits and risks of insomnia medicines. There are many different types of sleep aids for insomnia, including over-the-counter (non-prescription) and prescription medications. Determining which medication may be right for you depend on your insomnia symptoms and many different health factors. This is why it's important to consult with a doctor before taking a sleep aid. Major classes of prescription insomnia medications include benzodiazepine hypnotics, non- benzodiazepine hypnotics, and melatonin receptor agonists.

6.2.2 Over-the-Counter Products [30]

Some over-the-counter (OTC) products claim to treat insomnia. These products include melatonin, L-tryptophan supplements, and valerian teas or extracts. The Food and Drug Administration doesn't regulate "natural" products and some food supplements. Thus, the dose and purity of these substances can vary. How well these products work and how safe they are isn't well understood. Some OTC products that contain antihistamines are sold as sleep aids. Although these products might make you sleepy, talk to your doctor before taking them. Antihistamines pose risks for some people. Also, these products may not offer the best treatment for your insomnia.

6.2.3 Hypnotic drugs [31]

Hypnotic drugs have proved effective in the management of short-term sleep disturbances (up to three to four weeks), provided they are prescribed within their license and an exit strategy is agreed with the patient. They should only be used for conditions that do not result from recreational, occupational or lifestyle abuse of sleep mechanisms. Longer-term use introduces serious risk, with major problems including tolerance, dependence, and residual sedation and accident risk. Benzodiazepine users face increased risk of falls and fractures, of auto accidents, of reduced cognition [13].

6.2.4 Melatonin [20]

Melatonin is crucial in maintaining a healthy sleep pattern if you don't have enough melatonin you are not going to sleep soundly. Melatonin is a hormone and can be taken in a drug form like many other replacement hormones, however it is not licensed for prescription in country as synthetic hormones do have side effects plus if you take a substitute hormone the body can shut down production of its own supply. Melatonin can be

acquired via a private prescription from some pharmacies or from various internet pharmacy sites. The most effective way to increase your melatonin levels is to stimulate your own body to produce more of its own supplies of melatonin.

6.3 Electronic Sleep Inducer

An electronic sleep inducer based on the use of geomagnetic fields is a fast growing method for sleep induction. As some people feel better in natural environment, it is due to alterations in their EEG by the interference of geomagnetic field.

VII. EFFECT OF GEOMAGNETIC FIELD ON HUMAN BRAIN

For centuries humans have noticed connections between human behavior and planetary positions. Laboratory studies have found that magnetic fields can affect brain waves as well as glandular activity, although precise correlation's between brain wave patterns and the geomagnetic field. Electrical recordings from the surface of the brain or even from the outer surface of the head demonstrate that there is continuous electrical activity in the brain.

In healthy people the electrical recording classified the brain waves as alpha, beta, theta and delta. Electrical recording is done by EEG. Electroencephalogram (EEG) is produced when electrodes are placed on a person's scalp and attached to a recording device can record the brain's electrical activity [14].

These waves have different ranges of frequencies, some of which are altered by the patterns of electromagnetism in our environment (Radio waves, cell phone microwaves, TV, and general noise from electric circuits also generate electromagnetic frequencies). The minute electromagnetic patterns of the Earth are also a part of the environment. Brain waves are a mixture of these frequencies, which vary depending on human activity, that is, sleeping, meditating, visualizing, concentrated alertness, etc. The GM field also affects brain rhythms and hormone balance. As human's hormones vary, so do the person's feelings [15].

7.1 Waves of Brain

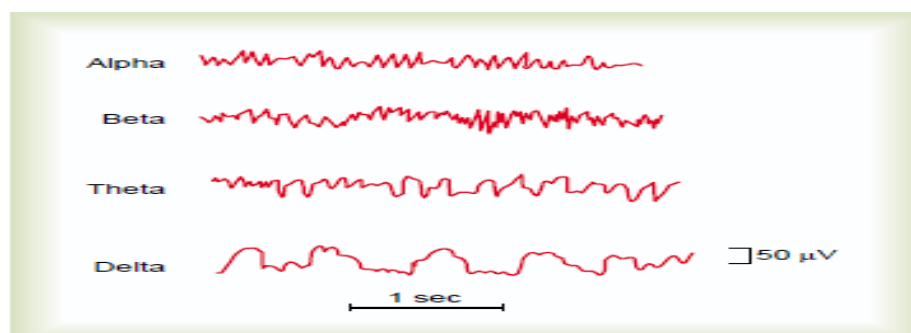


Fig No 1: Different Types of Brain Waves in the Normal Electroencephalogram. [16]

Alpha waves are rhythmical waves that occur at frequencies between 8 and 13 cycles per second and are found in the EEGs of almost all normal adult people when they are awake and in a quiet, resting state of cerebration. Their voltage usually is about 50 microvolt's. During deep sleep, the alpha waves disappear. When the awake

person's attention is directed to some specific type of mental activity, the alpha waves are replaced by asynchronous, higher-frequency but lower-voltage *beta waves* [16a].

Beta waves occur at frequencies greater than 14 cycles per second and as high as 80 cycles per second. They are recorded mainly from the parietal and frontal regions during specific activation of these parts of the brain [16b].

Theta waves have frequencies between 4 and 7 cycles per second. They occur normally in the parietal and temporal regions in children, but they also occur during emotional stress in some adults, particularly during disappointment and frustration. Theta waves also occur in many brain disorders, often in degenerative brain states [16c].

Delta waves include all the waves of the EEG with frequencies less than 3.5 cycles per second, and they often have voltages two to four times greater than most other types of brain waves. They occur in very deep sleep, in infancy, and in serious organic brain disease [16d].

The discharge of a single neuron or single nerve fiber in the brain can never be recorded from the surface of the head. Instead, many thousands or even millions of neurons or fibers *must fire synchronously*; only then will the potentials from the individual neurons or fibers summate enough to be recorded all the way through the skull [16e].



Fig No: 2, Replacement of the Alpha Rhythm by an Asynchronous, Low Voltage Beta Rhythm When the Eyes are Opened.[16]

Above figure shows, when the eyes were closed, synchronous discharge of many neurons in the cerebral cortex at a frequency of about 12 per second, thus causing *alpha waves*. Then, when the eyes were opened, the activity of the brain increased greatly, but synchronization of the signals became so little that the brain waves mainly nullified one another, and the resultant effect was very low voltage waves of generally high but irregular frequency, the *beta waves* [16f].

Effect of Varying Levels of Cerebral Activity on the Frequency of the EEG:

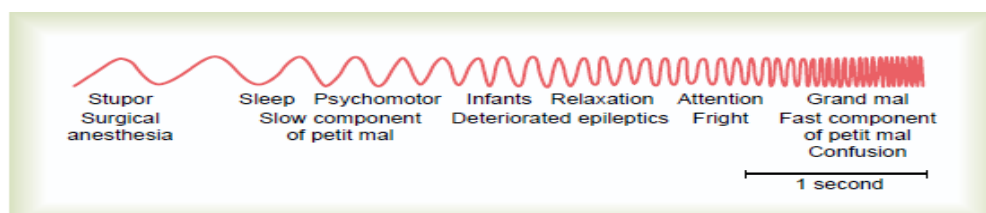


Fig No: 3 Effect of Varying Degrees of Cerebral Activity on the Basic Rhythm of the Electroencephalogram. [16]

There is a general correlation between level of cerebral activity and average frequency of the EEG rhythm, the average frequency increasing progressively with higher degrees of activity. This is demonstrated in Fig No: 3 during periods of mental activity, the waves usually become asynchronous rather than synchronous, so that the voltage falls considerably, despite markedly increased cortical activity,[17g] as shown in Fig No:2

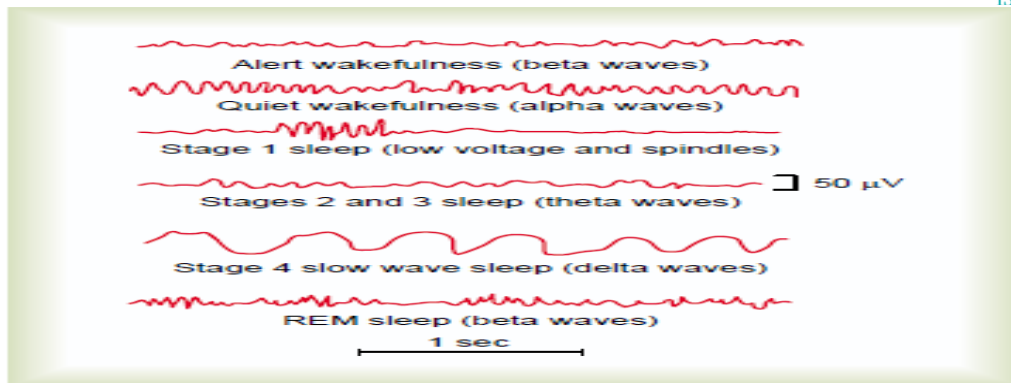


Fig No: 4 Progressive Changes in the Characteristics of the Brain Waves During Different Stages of Wakefulness and Sleep. [16]

Fig No: 4 show EEG patterns from a typical person in different stages of wakefulness and sleep. Alert wakefulness is characterized by high-frequency *beta waves*, whereas quiet wakefulness is usually associated with *alpha waves*, as demonstrated by the first two EEGs of the figure. Slow-wave sleep is divided into four stages. In the first stage, a stage of very light sleep, the voltage of the EEG waves becomes very low; this is broken by “*sleep spindles*,” that is, short spindle-shaped bursts of alpha waves that occur periodically. In stages 2, 3, and 4 of slow-wave sleep, the frequency of the EEG becomes progressively slower until it reaches a frequency of only 1 to 3 waves per second in stage 4; these are *delta waves*. Finally, the bottom record in Fig no: 4 show the EEG during REM sleep.

From above discussion we can conclude that with a single pulse, we were able to induce a wave that looks identical to the waves the brain makes normally during sleep. The study shows that magnetic signals may produce exactly the same effects as weak electric signals [19].

An Electric Sleep Inducer was invented in **1983** by **Junji Matsumoto, Shohei Kamiya, and Yasuhiko Sugihara** with patent Application No. **US 4418687 A** had following features about frequency [17]:

The initial frequency is 14 Hz. This corresponds to the frequency of a spindle wave which appears at the second stage of an NREM (Non Rapid Eye Movement) sleep. the arrangement gradually lower the frequency of the applying pulses from 14 Hz to 0 Hz in a non-stepwise manner most effectively introduces a sleep by inhibiting the sympathetic nervous system of a human body.

A report was published by Elsevier Ireland Ltd in 2004 about “**Effect of low frequency magnetic fields on brain electrical activity in human subjects**”. According to this report the ability to respond to presence of 1 G, 60 Hz is a common characteristics of human subjects .the increased sensitivity for detecting the effect of magnetic field, compared with the previous studies can be explained by assuming that dynamically non linear neuronal systems facilitated detection of field [18].

In November 2006 the University of Lubeck sleep study disclosed that slowly oscillating Delta rhythm electric stimulation applied via surface electrodes on the scalp induced an immediate increase in spectral power at the same slow wave frequency band, increased endogenous cortical slow oscillations, and increased slow spindle activity in the frontal cortex, resulting in improved slow wave sleep and subsequently better memory consolidation [19].

And one more study related to melatonin hormone secreted by pineal gland as discussed earlier in treatment, the pineal gland is very responsive to electromagnetic fields. When a strong magnetic field is placed around the



head the pineal gland is stimulated to work harder and as a result it produces more melatonin. Over a period of a few days-a couple of weeks (depending on the individual) the body's melatonin levels will have increased to normal. Once melatonin levels have reached normal the body clock begins to reset itself and insomnia will resolve. The majority of insomnia sufferers will achieve very good results when using magnets in their pillow every night. Tests have shown that magnetic pillow pads reduce jetlag in long haul flight crews and they have been tested on chronic insomnia patients. The pillow pad must be left inside the pillow case permanently to prevent the body clock from becoming out of alignment again [20].

A paper was published in **International Journal of Engineering Research & Technology** in 2013 by **Md. Mahadi Hasan, Sourav Dev, Arif Ahammad** entitled **Analysis, Design and Implementation of a Biomedical Sleep Inducer, designed**, designed a circuit which creates and radiates an electromagnetic field through a radiator coil and creates an environment helpful for sound sleep[6].

VIII. COMPARITIVE ANALYSIS OF DIFFERENT TYPES OF TREATMENT

S.No.	TREATMENT	DISCRIPTION	SHORTCOMINGS
1.	LIFE STYLE CHANGES	1) Use of Caffeine, tobacco, alcohol and other stimulant.	1) They might make sleep easier but excess is harmful.
		2) Bed room habits i. Follow the routine. ii. Make bed room sleep friendly. iii. Exercise.	2) As they are non meditative but are time consuming.
		3) Yoga asana can help to address the problem of insomnia at the physiological and psychological level.	3) As they have no such side effect but should be done under the supervision of instructor.
2.	COGNITIVE BEHAVIORAL THERAPY	1) Sleep hygiene: do's and don'ts of sleep management. 2) Sleep restriction: increasing night time sleepiness by limiting other opportunities of sleep. 3) Stimulus control: reducing time spent in bed awake. 4) Cognitive therapy: controlling pre sleep thoughts. 5) Relaxation: physical strategies.	1) Time consuming and for acute insomnia. 2) Not for older people and done under skilled therapist. 3) Time consuming and for short term cases. 4) Most preferred and costly. 5) Improves measures of sleep not day time functions.
3.	PRESCRIPTIVE MEDICINES	They are meant for short term and long term uses.	You may feel groggy in the morning, sleep eating, sleep walking or driving while asleep.
4.	OVER THE COUNTER	They include L-tryptophan supplements, valerian teas and extracts.	They make you sleepy and how they work and safety about them is not understood well.



5.	HYPNOTICS	They mainly include Benzodiazepines.	They are for short term disturbances and longer term use can serious risks such as tolerance, dependence and residual sedation.
6.	HORMONE	It includes melatonin.	It is not licensed for prescription as synthetic hormones do have side effects plus if you take a substitute hormone the body can shut down production of its own supply.
7.	ELECTRONICS	Electronic Sleep Inducer based on the pattern of EEG waves generated in the brain.	Its adverse effects on human body are being studied.

Here are some of the recent findings which will cheer up the insomniacs:

- Northumbria University researchers showed that one CBT session cured acute insomnia in 73 percent of participants. Sixty percent of participants reported improvements in their sleep quality one month after the therapy. The effects were more pronounced three months after the study with 73 percent reporting an improvement in their sleep. Only 15 percent of the control age group did not go on to develop chronic insomnia [21].
- US scientists say they have developed a novel therapy for long term insomniacs which does not leave them taking ineffective drugs and suffering from intermittent sleepless nights. However, questions remain as to whether it is ethical [22].
- In research paper published in the Toxicon medical journal, scientists Jayaseelan Benjamin Franklin and Rajaiah Pushpabai Rajesh said they discovered the sleep inducing properties of the venom of conus araneosus, while trying to identify various compounds in it [23].
- Mice that have a particular brain chemical switched off become hyperactive and sleep for just 65 percent of their normal time, a new study shows. This discovery could help researchers to develop a new drug that promotes better sleep, or control hyperactivity in people with the medical condition mania [24].
- People who rely on prescription sleeping pills to treat chronic insomnia may be able to get relief from as little as half of the drugs may even be helped by taking placebos in the treatment plan, according to new research. These findings starkly contrast with the standard prescribing practices for chronic insomnia treatment [25].
- A protein called Taranis could hold the key to a good night's sleep, researchers have found. The researchers examined thousands of mutant fly lines and found a mutant, called taranis that slept a lot less than normal fly. Using a series of genetic code and biochemical experiments, the researchers tracked how Taranis interacted with other protein and saw that Taranis bound to a known sleep regulator protein called Cyclin A [26].
- A sleep promoting circuit located in the primitive brain stem has revealed how we fall into deep sleep. This is only the second sleep node identified in the mammalian brain whose activity appears to be both necessary and sufficient to produce deep sleep [27].



- Researchers have now revealed brain wave changes in patients receiving nitrous oxide or laughing gas. For a period of about 3 minutes after the administration of nitrous oxide at anesthetic doses, EEG recordings show large amplitude slow delta waves. This frequency is characteristic of our deepest sleep [28].
- Scientist thinks that they have discovered the switch in the brain that tells our body when to go to sleep. They are now trying to find out how to activate the sleep switch [29].

IX. CONCLUSION

Thus, insomnia seems to be a small problem where as it can cause a big trouble to human body. Physicians should recognize insomnia because of its effects on function and health. It can be treated with the help of behavioral treatment and hypnotic drugs. But we should give more importance to behavioral treatments. Hypnotic medications must be carefully monitored for adverse effects. New researches are being going on in this field.

X. BIBLIOGRAPHY

- [1]. drowsinessisredalert.com ,Everything you Want To Know About Insomnia
- [2]. sciencedaily.com, Improving sleep quality has pain control benefits, American pain society ,July 1,2015
- [3]. sciencedaily.com, REM sleep critical for young brain development; medication interferes, Washington State University, July 3,2015
- [4]. Textbook of Medical Physiology by C. Guyton ,John E. Hall ,Page No.739
- [5]. <http://www.trans4mind.com/jamesharveystout/index.html>
- [6]. International Journal of Engineering Research &Technology,2013,Analysis, Design and Implementation of a Biomedical Sleep Inducer, designed by Md. Mahadi Hasan, Sourav Dev, Arif Ahammad
- [7]. The American Academy of Sleep Medicine
- [8]. Google play newsstand, Alcohol addiction recovery triggers insomnia ,Wonder Women, Nov 7,2014
- [9]. Google play newsstand, Brain waves reveal insomnia risk ,Mid day ,March ,2015
- [10]. sciencedaily.com, Feeling impulsive or frustrated? Take a nap, University of Michigan ,June 29,2015
- [11]. HealthMeUp.com ,6 yoga poses help you de stress and sleep better, by Manisha Kharbanda ,May 20,2015
- [12]. Google play newsstand, How an insomnia therapy can help with other illness ,The New York Time ,by Austin Frakt ,Jul13,2015
- [13]. Google play newsstand, Continued questions on benzodiazepine use in older patients ,The New York Times, by Paula Span ,Feb14,2015
- [14]. Seeley's Fundamental of Human Anatomy and Physiology, by Cinnamon Van Putte, Jennifer Regan, Andrew F Russo, Page No. 220
- [15]. Earth's Magnetic Field: Is it a Global Brain? By Buryl Payne
- [16]. Textbook of Medical Physiology by C. Guyton, John E. Hall, Page No.742(a,b,c,d,e,f) ,Page No. 743(g,h)
- [17]. Google patent ,Electric Sleep Inducer
- [18]. "Effect of low frequency magnetic fields on brain electrical activity in human subjects", by Andrew A. Marino, Erik Nilsen, Andrew L. Chesson Jr., Clifton Frilot
- [19]. Futuristic Sleep Machine Now Reality ,Earth Pulse Technologies, LLC, Paul F. Becker



- [20]. www.magnetictherapyfacts.org ,Magnetic Stimulator, rTMS
- [21]. Google play newsstand, The simple therapy can drive away your insomnia, India today, June 4, 2015
- [22]. Google play newsstand, Insomniacs should be given placebos mixed with real pills –new study, RT August 5, 2015
- [23]. Google play newsstand, Snail venom may help treat sleep disorder, Mint (Trushna Udgirkar), Jul 8, 2015
- [24]. sciencedaily.com, Study finds brain chemicals that keeps wakefulness in check, Imperial College London, July 29,2015
- [25]. sciencedaily.com, Chronic insomnia sufferers may find relief with half of standard pill dose, University of Pennsylvania School of Medicine, August 3,2015
- [26]. sciencedaily.com, New sleep genes found, Thomas Jefferson University, June18,2015
- [27]. Findings may lead to new therapies for sleep disorders, including insomnia, Harvard School of Medicine and University of Buffalo School of Medicine and Biomedical Sciences
- [28]. sciencedaily.com, Uncovering the mechanism of our oldest anesthetic, Massachusetts Institute of Technology, July 6,2015
- [29]. dailymail.co.uk, Oxford University
- [30]. National Heart, Lung, and, Blood Institute
- [31]. Gponline.com clinical review: insomnia
- [32]. sciencedaily.com, Cognitive behavioral therapy for insomnia with psychiatric ,medical condition, JAMA network Journals, July 6,2015
- [33]. Google play newsstand, Alcohol not a good sleeping aid ,The Indian Express ,Indo Asian News Service,Jan19,2015
- [34]. National Sleep Foundation