

How to Cite:

Ghai, R., Sharma, C., Nagarajan, K., Mishra, S. K., Seth, D., Pandey, A., Kaushik, S., & Bhatt, P. (2022). An epidemiological investigation of insomnia: A survey. *International Journal of Health Sciences*, 6(S4), 7239–7250.
<https://doi.org/10.53730/ijhs.v6nS4.10162>

An epidemiological investigation of insomnia: A survey

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Abstract---Sleep is commonly defined as a state in which physical activities and sensory perception are greatly reduced, and it is frequently associated with our body's recuperative period. However, research has shown that sleep is also required for other vital

processes such as memory consolidation and normal physiological functioning. Extensive research has shown that the areas that control our sleeping behaviour are the hypothalamus, brain stem, midbrain, and amygdala. These areas coordinate events during the non-REM and REM phases of sleep-wake cycles. GABA and adenosine, two chemical neurotransmitters, are also involved and play an important role in our sleep cycle. Insomnia has caused a slew of psychological and physiological issues such as fatigue, decreased mental concentration, irritable nature and a higher risk of heart attacks and stroke. It has reduced the patient's quality of life of the patient and have a social impact on them. Primary insomnia is defined as the inability/absence of proper sleep and impaired daily life functioning. Secondary insomnia, on the other hand, is believed to result from pre-existing medical conditions, substance abuse, or as a side effect of certain drug therapy. Insomnia is diagnosed through physical examination and the use of electrical devices to monitor sleep behavior. Both non-pharmacological and pharmacological approaches have been well established for their treatment, which significantly aids in the alleviation of insomnia.

Keywords---insomnia, non-REM, sleep disorder, parasomnia, sleep apnea.

Introduction

Sleep & Importance

Sleep is a natural state of mind and body that occurs routinely. Sleep occurrence is classified into two types: rapid eye movement sleep (REM sleep) and non-REM sleep. Insomnia, hypersomnia, narcolepsy, and sleep apnea can all affect humans. ^[1] Getting enough sleep is essential for optimal health and well-being and is linked to several brain processes. Insufficient sleep can decrease glucose metabolism and raise blood pressure, which can lead to diabetes and hypertension, and other disorders. ^{[2][3]} Lack of sleep causes exhaustion, which impairs the immune system and makes a person more vulnerable to injuries. In addition, sleep is necessary for the physiological, biochemical, and cognitive rejuvenation of the body. The amygdala, a region of the brain associated with our fight or flight response, is responsible for activating intense emotions like rage and hatred. Sleep deprivation increased emotional sensitivity in the amygdala by more than 60%, resulting in anger and emotional disturbance. Therefore, we develop improper emotional reactions and are unable to place things and circumstances in appropriate contexts. As a result, sleep is critical to a person's quality of life to maintain a healthy socio-emotional balance. Moreover, the inability to sleep or oversleeping are two of the most common symptoms of clinical depression. ^[4]

Stages of Sleep

Sleep is divided into two categories: REM (rapid eye movement) and non-REM (non-rapid eye movement) sleep (further divided into three more stages). Each is linked to a different set of brain waves and neuronal activity.

The transition from wakefulness to sleep is referred to as stage 1 non-REM sleep. Next is stage 2 of non-REM sleep, which is a light sleep stage that precedes profound sleep where the temperature of the body drops and the eye motions ground to a stop. The activity of the brain waves slows down. Stage 2 non-REM sleep takes up the majority of the repeated sleep cycle. The third stage of non-REM sleep is the period of deep sleep that refreshes a person until the morning. It occurs more frequently in the first portion of the night. During sleep, both heart rate and respiratory rate slow to their lowest level. However, brain wave activity becomes closer to that seen in wakefulness. Breathing becomes faster and irregular, and heart rate and blood pressure increase. ^[5]

Sleep Mechanism

There are two internal biological mechanisms of sleep that work together to regulate wakefulness and sleep. Circadian rhythms play a role in a variety of processes, including variations in wakefulness, body temperature, metabolic activities, and hormone secretion. It also controls our sleeping habits, keeping us sleepy at night and leading us to awaken without any need for an alarm. Our body clock, which is centred on a 24hr day, regulates the majority of sleep patterns. Circadian rhythms are synchronized with environmental elements (light, temperature) associated with the correct time of day, but they can also exist without them. Our eyes' retinas have specialized cells that receive light and signal our brains whether it's day or night, allowing us to shift our sleep-wake cycle forward or backwards. After being exposed to daylight, it can be difficult to fall asleep and wake up. Since their normal circadian cycle and sleep-wake pattern are interrupted, employees, working late nights often have problems maintaining sleep after going to bed and staying awake at the workplace. Sleep deprivation occurs when people's sleeping patterns go out of rhythm with the period of day they sail. Medicine, tension, sleeping environment, and regular nourishment influence our sleeping patterns, but light exposure has the greatest impact.

Types of Insomnia

Transient insomnia is a type of insomnia that is just temporary and lasts approximately one-week. Acute insomnia is described as an inability to get enough sleep on a regular basis for less than a month. It happens when falling asleep or staying asleep is difficult. Acute insomnia is also known as stress-related insomnia or short-term insomnia. Sleeplessness that lasts more than a month is referred to as chronic insomnia. When a person has difficulty sleeping or staying asleep for at least three nights a week for three months or more.

Causes of insomnia

Hormonal changes, such as those that occur before menstrual and throughout menopause, are the reasons for insomnia. Insomnia can be caused by gastrointestinal problems and mental diseases such as major depression, suicidal thoughts, severe anxiety, posttraumatic stress disorder (PTSD), schizophrenia, obsessive-compulsive disorder (OCD), dementia, and Attention deficit hyperactivity disorder (ADHD). [6]

Molecular Mechanism & Models of Insomnia

Insomnia, also referred to as sleeplessness, is a sleep condition in which an individual have trouble sleeping. It may cause trouble with focusing, concentrating, and memorising, as well as an increased risk of accidents. Long-term insomnia lasts longer than a month, while short-term insomnia can last days or weeks. Depression, hypertension, diabetes, and cardiovascular disease are all risk factors for insomnia. [7] In terms of the mechanism of insomnia, there are two primary theories.

1. Cognitive model: It says that deep thoughts, stress, sleep-anxiety, and hyperarousal, post-traumatic stress syndrome (PSTD) lead to insomnia. Sleep anxiety concerns a person's inability to fall asleep. Hyperarousal insomnia occurs when the autonomic nervous system goes into overdrive, triggering a fight-or-flight response. PTSD and significant levels of stress in the lives of these people are the most common reasons of insomnia.
2. Physiological model: In this model, the characteristics are increased cortisol and catecholamine, indicating a significant growth of the HPA (hypothalamic pituitary adrenal) axis and excitation in insomniacs; second, an increased rate of cerebral glucose utilization during awakenings; and third, enhanced complete body metabolic rate and cardiac output in insomnia. [7] Hyperarousal and heightened physical, intellectual, and cognitive activation are typically associated with insomnia. Hyperarousal is a term used to describe increased emotional and cognitive functions that disturb the sleeping pattern and make it more difficult to fall asleep. It can be detected through elevated cortisol, heart rate, and even personality reports. In addition, hyperarousal is offered as an overarching theme that, when combined with other relevant elements, adds to the insight of the pathogenesis of sleeplessness at each level of study and across levels in an integrated system.

The Molecular Mechanism

The molecular concept behind insomnia is the mediator imbalance that is associated with sleep control and circadian rhythm. Wake-promoting/sleep-suppressing chemicals include monoamine neurotransmitters, orexin, and histamine, while sleep-promoting / sleep-suppressing molecules include gamma aminobutyric acid [GABA], adenosine, serotonin, melatonin, and PGD₂. The breakdown of the brain's alternate cycles of wake-promoting and sleep-regulating neurotransmitters causes insomnia.[7]

Lifestyle practices

In order to prevent and treat insomnia, a mix of behavioural therapy, medicines, and lifestyle changes may be required. Heading to sleep and rising around the same time every day can help to maintain a consistent schedule that helps maintain the circadian rhythm (sleep cycle) and can help to prevent insomnia. Avoiding or restricting short naps during the day, as well as heavy meals and beverages, are all possible ways to promote sleep. ^[8]

Diagnosis

Insomnia does not have a specific test. Doctors utilise a variety of procedures to identify and evaluate insomnia symptoms, including face to face question-and-answer sessions, and having the individual fill out survey-based questions. An intrigued physical examination will help to determine certain illnesses such as COPD (chronic obstructive pulmonary disease), restless legs syndrome, asthma, and disturbed sleep confirm the physical diagnosis of sleep disorder or insomnia. Running certain blood profile tests, such as testing vitamin B₁₂ deficiency and iron deficiency anaemia can shed light on the reason for disturbed sleep. Various latest techniques like polysomnography which includes electroencephalogram (EEG), electrooculography (EOG), electromyography (EMG), electrocardiography (ECG) and pulse oximetry are used to show a multitude of outcomes like sleep apnea, narcolepsy, a periodic limb movement disorder. Actigraphy helps in measuring physical activity such as wake-up time, sleep-time, etc. that can be correlated. All of these tests aid the physician in developing an appropriate course of treatment. ^[9] Insomnia can be brought on by a variety of prescribed medicines. like anticonvulsants, antipsychotics, selective serotonin reuptake inhibitors (SSRI) or monoamine oxidase inhibitors, and non-steroidal anti-inflammatory medications (NSAIDs) ^[10]. Other measures that can be used to check sleep disorder or insomnia are by checking mental health status, quality of sleep, psychological evaluation, daytime functioning, quality of life, attitudes, beliefs etc. Investigations do not necessarily have to match a patient's insomnia symptoms, and they cannot always replace a clinical examination or diagnosis. Insomnia is a patient-reported symptom, not a disorder defined by polysomnography, so emphasis should be given to other symptoms. ^[11]

Treatment strategies

Here are some treatment strategies: -

- i. Cognitive-behavioral therapy: Cognitive behavioral treatment for insomnia (CBT-I) can help patients manage or eliminate unpleasant thoughts and behaviors that keep them awake. The individual identifies and mischaracterizes skewed beliefs towards more real, encouraging thoughts. It is also beneficial in people who have insomnia and anxiety problems as concomitant symptoms. ^[12]
- ii. Relaxation training: There are a variety of relaxation training programs available, including progressive muscle relaxation, mindful meditation, hypnosis, and guided imagery.

- iii. Bright-light therapy: Circadian rhythms, the body's inherent biological clock that governs certain brain wave activity and hormone synthesis, can be restored by light.
- iv. Sleep restriction: This therapy limits a person's time in bed and inhibits daytime naps, resulting in partial sleep deprivation and fatigue the next night. ^[13]
- v. Avoiding: Avoid caffeinated beverages and exercise during bedtime and use nonpharmaceutical remedies: use of herbal teas and essential oil with soothing fragrances, that calm the mind and help to fall asleep. ^[14]

Pharmacological therapies ^[15]

- a. Benzodiazepine receptor agonists- Alprazolam, triazolam, estazolam, temazepam.
- b. Nonbenzodiazepines 'z drugs'- zolpidem, zaleplon, and eszopiclone.
- c. Melatonin agonist- ramelteon.
- d. Tricyclic antidepressant doxepin.
- e. Barbiturates- phenobarbital, mephobarbital, and secobarbital.
- f. Orexin receptor antagonists-suvorexant.
- g. Antidepressants- trazodone, mirtazapine,
- h. Atypical antipsychotics- quetiapine, olanzapine, and risperidone.
- i. Antihistamines- diphenhydramine and doxylamine.

Materials & Methods

A google form was distributed to 500 people to research the sleeping pattern and drug use pattern, as well as to evaluate sleep apnea connected to sleep patterns. Inclusion restrictions included being at least 18 years old and being of any sex. Data were collected for two months. The responses were obtained on various parameters, viz. sex distribution, age, percentage of drug intake for insomnia, lifestyle habits, etc. Microsoft Excel and SPSS software were used for statistical analysis.

Result & Discussion

Table 3.1: Percentage of people complained of insomnia (n=500)

S. No	Responses	No of people	Percentage (%)
1	People affected from insomnia	283	57%
2	People not affected from insomnia	217	43%

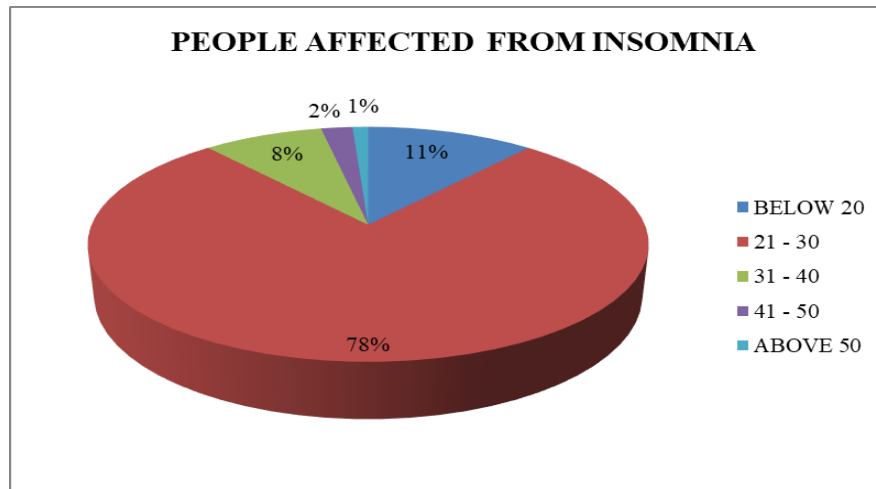
Table 3.1 shows that 57% of the people were afflicted by insomnia and 43% were not affected by insomnia.

Table 3.2: Percentage of gender distribution (n=500)

S. No	Sex	No of people with insomnia	Percentage
1.	Male	130/283	46%
2.	Female	153/283	54%

The table 3.2 shows that among 283 insomnia patients, 46% were males and 54% were females, indicating that females are more afflicted than males.

Graph 1: Percentage of age distribution in insomnia



Graph 1 shows that people between the ages of 21 and 30 are more prone to sleeplessness. The overall number of individuals afflicted between the ages of 21 and 30 was 78 per cent.

Table 3.3: Percentage of unusual sleeping habits (n=500)

S. No	Behaviors	No of people	Percentage (%)
1	Leg restlessness	2	1%
2	Murmuring	49	10%
3	Talk in sleep	12	2%
4	Yelling	12	2%
5	No behavior	425	85%

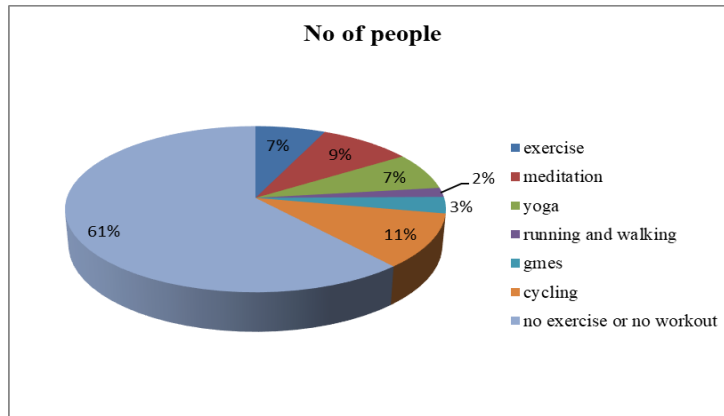
The table 3.3 depicts that 85% of the total population did not experience any change in behaviour during sleep.

Table 3.4: Percentage of people taking medicine for sleep (n=-500)

S. No	Medicine taken or not	No. Of people	Percentage (%)
1	Alprax 0.5mg	5	1%
2	Cetirizine	6	1%
3	Cough syrup	3	1%
4	Montelukast and levocetirizine	4	1%
5	No medicines were taken	482	96%

Table 3.4 shows that 96% of the total population did not take any medicine to sleep.

Graph 2: Percentage of people doing exercise, yoga, or meditating to sleep



Graph 2 represent that 61% of the total population did not perform any yoga, exercise or meditation for sleep

Table 3.5: Percentage-wise details of the responses using the survey questionnaire

Responses	Do you having difficulty falling asleep?	Do you have trouble staying asleep?	Do you use medications to help you sleep?	Do you drink alcohol? to help you sleep?	Do you have any medical problems that cause you to sleep poorly?
Never	125(25%)	197 (39.4%)	241(48.2%)	282 (56.4%)	283 (56.6%)
Rarely	136 (27.2%)	124 (24.8%)	99(19.8%)	76(15.2%)	100 (20%)
Occasionally	132 (26.4%)	106 (21.2%)	88 (17.6%)	90 (18%)	89 (17.8%)
Most of the nights/days	98 (19.6%)	69(13.8%)	69(13.8%)	52 (10.4%)	27 (5.4%)
Always	9 (1.8%)	4(0.8%)	3(0.6%)	0 (0%)	1(0.2%)

The table 3.5 shows that maximum people rarely have an issue with sleeping pattern or take medicines or alcohol to help in sleep.

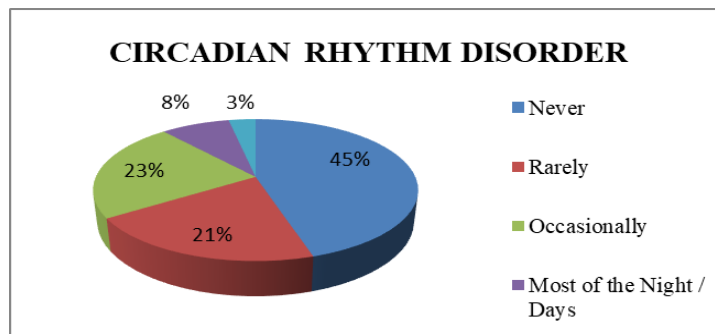
Table 3.6: Percentage of the participants suffering from psychiatric disorders

Responses	Have you lost your interests in hobbies?	Do you feel depressed, irritated, or hopeless?	Do you feel nervous or worried?	Do you have any apprehensions or concerns?
Never	177 (35.4%)	133 (26.6%)	120 (24%)	189 (37.8%)
Rarely	109 (21.8%)	127 (25.4%)	131 (26.2%)	128 (25.6%)
Occasionally	121 (24.2%)	144 (28.8%)	159 (31.8%)	114 (22.8%)
Most of the	80 (16%)	87 (17.4%)	79 (15.8%)	65 (13%)

nights/days				
Always	13 (2.6%)	9 (1.8%)	11 (2.2%)	4 (0.8%)

The table 3.6 depicts that people occasionally feel depressed, nervous and worried that may contribute to insomnia.

Graph 3: Percentage of the population suffering from circadian rhythm disorder



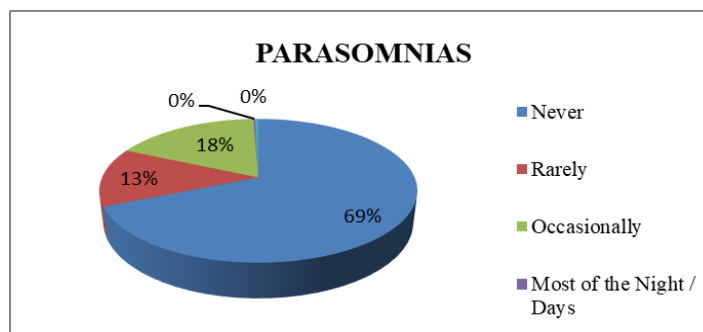
Graph 3 represents that 23 percent do have circadian rhythm disorders.

Table 3.7: Percentage of the participants affected by movement disorder

Responses	Are your legs agitated and/or unpleasant before going to bed?	Have you been informed that you are restless or that you sleep with your legs kicking?
Never	217 (43.4%)	186 (37.2%)
Rarely	125 (25%)	111 (22.2%)
Occasionally	87 (17.4%)	91 (18.2%)
Most of the night/days	64 (12.8%)	84 (16.8%)
Always	7 (1.4%)	28 (5.6%)

The table 3.7 depicts that 25% of people rarely affected by movement disorder.

Graph 4: Percentage of individuals suffering from parasomnias



The Graph 4 shows that 18% of individuals rarely suffer from parasomnias.

Table 3.8: Percentage of individuals having sleep apnoea (n=500)

Responses	Do you have a habit of snoring?	Has anybody ever told you that you should quit breaching, gasping, snorting, or choking in your sleep?	Do you having trouble keeping awake during the day?
Never	251 (50.2%)	301 (60.2%)	141 (28.2%)
Rarely	123 (24.6%)	102 (20.4%)	145(29%)
Occasionally	107 (21.4%)	97 (19.4%)	149 (29.8%)
Most of the nights/days	1 (0.2%)	0 (0%)	40 (8%)
Always	18 (3.6%)	0 (0%)	25 (5%)

This table 3.8 shows that 24.6% rarely have a habit of snoring and 29% rarely have trouble keeping awake during the day.

Table 3.9: Percentage of adults with an erratic sleeping routine (n=500)

Responses	No. of people	Percentage (%)
Never	226	45%
Rarely	103	21%
Occasionally	114	23%
Most of the nights/days	41	8%
Always	16	3%

Table 3.9 shows that 45 per cent of adults never had an erratic sleeping routine.

Table 3.10: Percentage of the population who have never been advised to quit gasping, snorting, or choking in their sleep

Responses	No. of people	Percentage (%)
Never	301	60%
Rarely	102	21%
Occasionally	97	19%
Most of the nights/days	0	0%
Always	0	0%

The table 3.10 shows that sixty per cent of the entire population studied had never been advised to cease gasping, snorting, or choking in their sleep.

Conclusion

From our study, it is concluded that 57% of our study population is affected by insomnia, with females (54%) comprising the major ratio. The common age group which is affected by sleep disorder belongs to range of 21-30 years (78%). Among these, only few participants complained about the behavioural change (15%) during sleep disturbances. Around 96% participants are not taking any medications to assist them in sleep induction whereas 4% are taking medication along with meditation and yoga for the alleviation of insomnia. Sleep pattern and

their various parameters are very essential for human life for optimum well-being and the prevention of central nervous system disorders. To maintain a healthy sleep pattern which is an important aspect of a healthy lifestyle, various methods should be practised on a daily basis such as, yoga, meditation, exercise, running and walking, games, cycling or any physical activities.

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