# Clinical Evaluation of The Excessively Sleepy Patient

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## Introduction

Excessive daytime sleepiness is a sleep related disorder that has the potential to cause significant impairment in the productivity of a person's daytime activities. It is also a serious public health concern. Most people experience occasional daytime sleepiness episodes at some or the other point of time in their lives. Such infrequent and irregular episodes can be attributed to certain factors such as late-night wakefulness related to work or social gatherings, short periods of use of drugs that cause mild depression of the CNS and such other reasons that cause short lived sleepiness during the day. This should not be confused with chronic sleepiness during the day which is prevalent in many people.

## Definitions

There are many ways of manifestations of excessive daytime sleepiness and therefore many ways of defining it.

Daytime sleepiness is defined as EXCESSIVE when it causes a subjective complaint or interferes with daily daytime function. The International Classification of Sleep Disorders, third edition (ICSD-3) defines EDS as the inability to maintain wakefulness and alertness during the major waking episodes of the day, with sleep occurring unintentionally or at inappropriate times almost daily for at least three months.[1]

**Hypersomnia** - The terms hypersomnia and hypersomnolence are sometimes used interchangeably with EDS. The ICSD-3 defines hypersomnolence as excessive sleepiness when wakefulness is expected, and hypersomnia as a disorder characterised by hypersomnolence.[1]

**Fatigue** - Fatigue refers to a subjective lack of physical or mental energy. Clinical fatigue incorporates three components, present to variable degrees in individual patients: inability to initiate activity (perception of generalised weakness, in the absence of objective findings); reduced capacity to maintain activity (easy fatigability); and difficulty with concentration, memory and emotional stability (mental fatigue).[1]

It is due to the widescale use of this subjective and inconsistent terminology such as drowsiness, languor, fatigue, sluggishness etc. to describe EDS by affected persons that there has been a lack of consensus on methods of diagnosis and assessment of EDS.[2]

## Prevalence

The lack of a standard definition of EDS and methods of diagnosis and assessments are the major reasons due to which prevalence of EDS among general population has been difficult to estimate.

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Even so there are studies that suggest that an estimate of 20% adults in USA report a level of daytime sleepiness sufficient to interfere with daily activities, and excessive daytime sleepiness is the leading symptom of patients presenting to sleep clinics.[2] In another 2004 National Sleep Foundation (NSF) poll on Sleep in America, children who had a television or computer in their room slept less than those without such electronic devices. In the 2009 NSF's poll on sleep, 20% of American adults 18 years of age or older reported that they got an average of less than 6 hours of sleep. This percentage had greatly increased from a similar poll of 2001 when only 13% reported getting less than 6 hours of sleep.[3]

Having looked into the data available on American population an Indian study conducted by Gurjeet Kaur and Amarjeet Singh suggested a whopping 45% of the study population (1215 College students) having EDS.[4]

**Public Health Implications**

Excessive daytime sleepiness is a dangerous disorder that can heavily impair a person's daytime productivity and alertness and result in poor performance and decreased job satisfaction. It has been quoted as one of the major causes of many industrial and other work-related accidents and road accidents among heavy vehicle and transport vehicle drivers and adolescent or young adult drivers. It has also been linked to compromised professional performances including physicians and judges.[2] This was also corroborated by the Indian study on student population which highlighted the increased occurrence of EDS among students of professional streams thereby pointing towards the probable incidence of professionals related accidents.

Shorter sleep times have been shown to increase the risk of developing hypertension, obesity[3,5] and diabetes. Increased sleepiness has also been correlated with worsened mood, anxiety and fatigue. Conversely, getting adequate amount of sleep has been associated with decreased coronary calcifications.[3]

Despite the significant impact of sleepiness, only half of those individuals experiencing problems with their sleepiness ever report these issues to their health care provider. It can be stated that due to under reporting of sleep related disorders, the prevalence of these, including sleepiness, may be higher than estimated. Because of the dangerous and possibly fatal implications of poor sleep and sleepiness, it is imperative for health care providers to recognise this common problem and to evaluate their patients for sleep issues. Concurrently, it is imperative that the public also be educated on the serious effects of sleepiness and encouraged to address these issues.[3]

**Normal Sleep**

Sleep is recognised as an active process necessary for health and well-being. It is generally felt to be restorative to the brain and important in memory and learning. REM sleep may play an

important role in learning and memory consolidation.[3]

## CAUSES OF EDS

*Table 1: Common Causes of EDS*

| Cause | Comments |
|---|---|
| **Primary hypersomnias of central origin** | |
| Narcolepsy | 0.02 to 0.18 percent of population |
| Idiopathic hypersomnia | 10 percent of patients with suspected narcolepsy |
| Other rare primary hypersomnia | Example: Kleine-Levin syndrome |
| **Secondary hypersomnias** | |
| Sleep disorders | |
| Sleep-related breathing disorders | Excessive daytime sleeping secondary to obstructive sleep apnoea (general population prevalence is 2 percent of women and 4 percent of men) |
| Behavioural sleep deprivation | Especially common in adolescents and shift workers |
| Other sleep disorders | Includes circadian rhythm sleep disorders, sleep-related movement disorders |
| **Medical or psychiatric conditions** | |
| Medication effect | Includes prescription, nonprescription, and drugs of abuse |
| Psychiatric conditions | Especially depression |
| Medical conditions | Includes head trauma, stroke, cancer, inflammatory conditions, encephalitis, neurodegenerative conditions |

Note: Hypersomnia due to secondary causes is much more common than primary hypersomnia

There are various reasons why EDS can occur like disruption of sleep, substances abuse, obstructive sleep apnoea (OSA), psychiatric conditions etc.

### Sleep Deprivation

Self-induced or socially or professionally dictated lack of sleep or shortened sleep duration is one of the most common causes of EDS. Just one night of sleep deprivation is enough to cause the symptoms and persons with prolonged deprivation fail to recognise their increasing performance and cognitive deficits.[1,2]

### Medication, Drug Effects and Substance Abuse

While sleepiness is a commonly reported side effect of drugs that act on one or more of the central neurotransmitters, the abuse of these medications (sedating antihistaminics, long acting benzodiazepines, sedating anti-depressants etc.) and other abusive substances (ethanol, opioid derivatives) along with the increased consumption of neuro stimulants like caffeine may cause exacerbations of EDS, if caffeine is withdrawn.[5]

### Hypersomnias

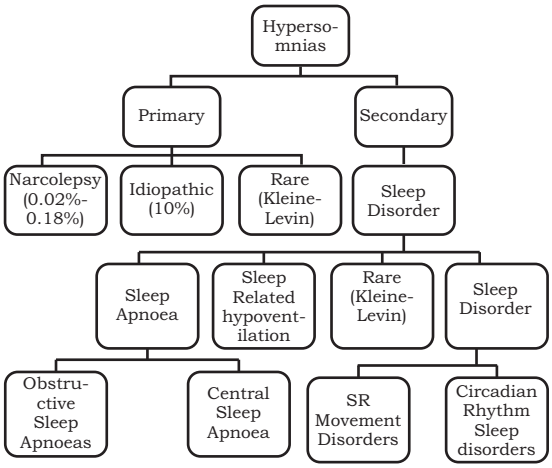


*Fig. 1: Classification of Hypersomnias; SR - Sleep Related.*

### Primary Hypersomnias

1. Excessive sleepiness caused by a primary hypersomnia of central origin {e.g., narcolepsy (0.02% to 0.18% population, idiopathic hypersomnias (10% of patients with suspected narcolepsy) or rare conditions like Kleine-Levin syndrome, menstruation

hypersomnia etc.} is less common.[2]

**Secondary Hypersomnias**

1. Sleep Apnoeas - Sleep apnoeas may be breathing related (OSA)or central.
   a. Obstructive Sleep Apnoea (OSA) - Excessive daytime sleepiness is the most common symptom of OSA. A sleep disorder caused by blockage of the upper airway, OSA results in episodes of cessation of breathing (apnoeas) or a reduction in airflow (hypopnoeas). In patients with OSA, approximately 23 percent of women and 16 percent of men experience excessive daytime sleepiness due to sleep fragmentation and disturbed sleep architecture.[2]
   b. Central Sleep Apnoea - In central sleep apnoeas, the apnoeas are not associated with any respiratory effort but mainly due to delay in chemoreceptors or in patients with congestive cardiac failure due to delay in circulation time. The apnoeas, nevertheless, are responsible for frequent night time awakenings leading to EDS.[3]
2. Sleep Related Hypoventilation - Sleep related non obstructive hypoventilation is characterised by shallow breathing accompanied by an increase in $CO_2$ and decrease in oxygenation. They frequently occur in patients with chronic lung disease or chest wall abnormalities. These patients also experience frequent night awakening leading to EDS.[3]
3. Sleep related movement disorders - Periodic Limb Movement Disorder (PLMD) and Restless Legs Syndrome (RLS).
   a. PLMD - PLMD is a commonly encountered sleep related disorder and is potentially a cause of EDS. In PLMD patients experience involuntary, but non-epileptic, stereotypical movements of their limbs, especially during non-rapid eye movement (NREM) sleep and during the 1st half of the night.[5]
   b. RLS - Approximately 80% of RLS patients undergoing polysomnography were found to have PLMD, however, PLMD is recognised as a separate condition from RLS. People with RLS have uncomfortable sensations in their legs (and sometimes arms or other parts of the body) and an irresistible urge to move their legs to relieve the sensations. This always disturbs sleep and causes EDS.
4. Circadian Rhythm Sleep Disorders[3] - The types of disorders in this sub-type are:
   a. Delayed Sleep Phase Syndrome (DSPS) - Patients with DSPS have sleep and wake times at least 2 hours delayed from normal societal bed times and may complain of EDS if asked to maintain conventional sleep-wake schedules.
   b. Advanced Sleep Phase Syndrome

(ASPS) - ASPS is a relatively uncommon disorder that causes advanced sleep wake times compared to conventional. Persons with ASPS generally have difficulty staying awake in the latter part of the day.

c. Shift work sleep disorder - shift workers experience circadian rhythm disorders resulting from their work schedules. They often have difficulty initiating sleep, maintaining sleep or sleepiness. They also have other personal obligations to fulfil during their non-work hours, adding to their sleep deprivation.
d. Jet lag disorder - In this disorder a dyssynchrony exists between one's intrinsic circadian rhythm and the typical schedule of the new environment which results in rapid change in time zones resulting in EDS.

**Other Medical, Genetic and Psychiatric Causes**

Other causes of EDS include neurological disorders like myotonic dystrophy, Parkinson disease; electrolyte imbalances; genetic disorders like Prader-Willi syndrome; medical conditions like hypothyroidism, hepatic encephalopathy; psychiatric disorders such as depression, anxiety etc.[1]

**ASSESSMENT OF EDS**

**A Complete History**

A thorough history is very important in assessing excessive daytime sleepiness. As mentioned earlier, many patients do not report the symptoms of sleepiness to their medical care providers despite experiencing symptoms for a prolonged duration. Hence, standardised questionnaires like the Stanford Sleepiness Scale and the Epworth Sleepiness Scale are validated, patient-completed assessments of daytime sleepiness that can be used as screening tests. A test score in excess of 12 on the Epworth Sleepiness Scale or a patient history of falling asleep while driving are clear indications that further evaluation and work-up are required.[2]

*Table 2: Patient questionnaire for rating EDS using Epworth Sleepiness Scale.*

**Patient Health Questionnaire:**
**Excessive Daytime Sleepiness**

0 = No chance of dozing off
1 = Slight chance of dozing off
2 = Moderate chance of dozing off
3 = High chance of dozing off

**Rate the chance that you will doze off in the following situations:**

Sitting and reading

Watching television

Sitting inactive in a public place (e.g., in a theater, during a meeting)

As a passenger in a car riding for an hour without breaks

Lying down in the afternoon when circumstances permit

Sitting and talking to someone

Sitting quietly after lunch without alcohol

In a car while stopped for a few minutes in traffic

**Add above for total score**

Less than 8 : indicates reported normal daytime alertness
8 to 11 : indicates mild sleepiness
12 to 15 : indicates moderate sleepiness
16 to 24 : indicates severe sleepiness

NOTE: One need to discuss his sleepiness with his doctor if he: scored less than 12 on this sleepiness test: regularly fall asleep in class, church or meetings; or have even fallen asleep while driving. Treatment options exist to help alleviate daytime sleepiness. One should never drive when excessively sleepy-sleepiness is a serious contributing risk factor in many motor vehicle accidents.

Specific questions should be asked with respect to medication history to address the use of prescription and non-prescription medications and abusive substances. Information about sleep patterns from the patient and his or her bed partner, if applicable, may indicate restless legs syndrome or OSA.

**Tools for Evaluating Sleepiness**[3]

1. Apart from the Epworth Sleepiness Scale, sleep logs or diaries may assist in documenting sleep and wakeful times, number of arousals at night, use of sleeping aids etc.
2. A Polysomnography (sleep study) is indispensable in the diagnosis of OSA.
3. Blood tests must include Thyroid function tests, Liver profile, Renal Profile, Haemogram, Electrolytes, Arterial Blood Gas and any more that the medical care provider feels necessary.
4. The Multiple Sleep Latency Test (MSLT), performed a day after Polysomnography, objectively assesses a patient's propensity to fall asleep where patients take successive naps at 2-hour intervals and the time to sleep onset is measured using polysomnographic criteria. Generally, a mean sleep latency of less than 15 minutes is considered being mildly sleepy, less than 10 minutes is moderately and less than 5 minutes qualifies as severely sleepy.[5,3]
5. Maintenance of Wakefulness Test (MWT) provides information on an individual's ability to stay awake rather than the propensity to fall asleep. It is performed on individuals in whom sleepiness would cause a significant public or personal health risk such as transportation and industry workers.

**TREATMENT**[2,3]

There is no single line or standard theoretical line of treatment for Excessive Daytime Sleepiness. Treatment approach involves addressing the underlying contributing factors of EDS.

1. In patients of OSA having complaints of EDS, positive airway pressure therapy is the mainstay of treatment. Other therapies may include positional therapy, weight management or upper airway surgery.
2. For hypoventilation syndromes and some other forms of sleep apnoeas, $O_2$ or other modes of positive airway therapy may be needed.
3. Counselling about insufficient sleep or poor sleep hygiene may assist in recommending extension of sleep durations and good sleep habits such as maintaining a set bedtime and wake time each day if EDS is due to insufficient sleep.[1,3]
4. Morning light therapy helps to manage DSPS and evening light therapy helps in the management of ASPS. For Jet lag appropriate use of sleep aids may benefit while in shift work sleep disorder, a well-lit environment and a possible scheduled napping may be helpful.
5. Modafinil (Provigil) is considered to be

the first-line activating agent for the treatment of excessive daytime sleepiness associated with narcolepsy.

6. Alterations in the types or doses of medications or scheduling naps in addition to medication therapy that could be the probable cause of EDS.
7. Continued efforts to treat EDS, if it is due to underlying medical or psychiatric problems.[1]

**Summary**

- Excessive daytime sleepiness is a prevalent and potentially dangerous condition to an individual or the general public at large that may be caused due to sleep disorders, sleep deprivation, underlying medical or psychiatric conditions or medications or substance abuse.
- It is one of the major causes of work related, road, rail and airline related accidents.
- It also contributes to cardiovascular risks, obesity and depression and conversely optimising sleep issues may minimise these risks.
- Due to the general predicament to under report EDS, medical care providers must take efforts to assess the symptoms with the appropriate tools and questionnaire so as to implement the most effective line of treatment.
- Continued efforts to increase the awareness of the individual and the public health implications of excessive daytime sleepiness are highly important to improve societal health and safety.

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**Exercise can prevent depression**

If healthy adults exercise for a minimum of an hour each week, their risk of incident depression can be reduced by 12%.

The present study provides a further reason for GPs to recommend regular exercise to all their patients providing there are no medical contraindications. There is a need for further studies to investigate the potential value of exercise in depression relapse prevention i.e. secondary prevention.

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