SLEEP DISORDERS

Annie P. Alexander * | C Nalini Jeyavantha Santha **

** PhD Scholar & HOD of Mental Health Nursing, Upasana College of Nursing, Kollam, India.*

*** Guide & Principal, Sacred Heart College of Nursing, Madurai, Tamilnadu, India.*

ABSTRACT

Sleep is a basic human need. Nearly one third of human life is spent in sleep. Sleep is required for many reasons, to cope with daily stresses, to prevent fatigue, to conserve energy, to restore the mind and body, and to enjoy life more fully. The phases of sleep are D-sleep (desynchronised or dreaming sleep), and S-sleep (synchronised sleep). According to duration, it is classified as long sleepers and short sleepers. A sleep disorder is characterised by alteration in sleep patterns of a person. Sleep disorders are known as non-organic sleep disorders in ICD-10. Sleep disorders are mainly classified into Dyssomnias, and Parasomnias.

Key Words: *Sleep, Sleep Cycle, REM sleep, NREM Sleep, Sleep Disorders, Sleep hygiene, Relaxation Techniques.*

ABOUT AUTHORS

Author Mrs. Annie P. Alexander is M.Sc Nursing specialized in Mental Health Nursing (RNRM). She is a registered psychiatric nurse and has 17 years of teaching experience. She worked as Associate Professor and HOD of Mental Health Nursing Department at Bishop Benziger College of Nursing, Kollam, S.S.N.M.M College of Nursing, Varkala. She is a Ph.D Scholar and working as HOD of Mental Health Nursing Department, Upasana College of Nursing, Kollam.

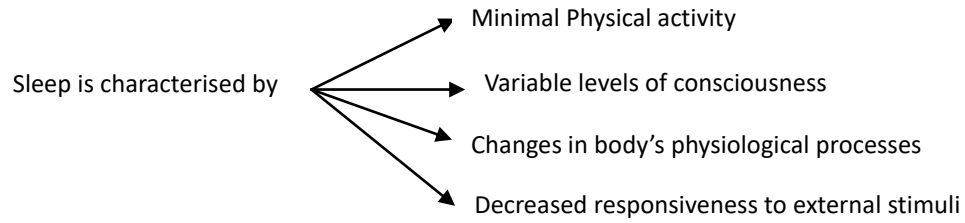
Author Dr.C Nalini Jeyavantha Santha is working as Principal for 16 years in Sacred Heart College of Nursing, Madurai, Tamilnadu. She is a Research Guide for PG Students and Ph.D Scholars. She has presented more than 20 papers in various National and International conferences and organized various workshops and conferences.

INTRODUCTION

Sleep is a basic human need. Nearly one third of human life is spent in sleep. Sleep is required for many reasons, to cope with daily stresses, to prevent fatigue, to conserve energy, to restore the mind and body, and to enjoy life more fully.

SLEEP

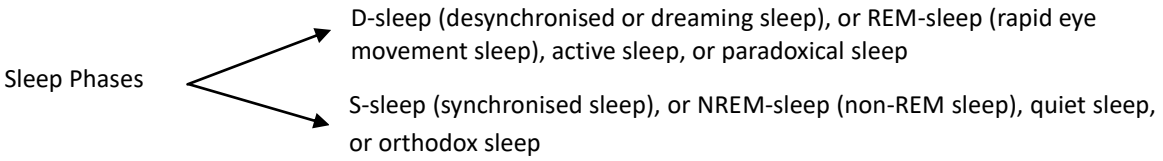
Sleep is considered as an altered state of consciousness in which the individual's perception and reaction to the environment are decreased.



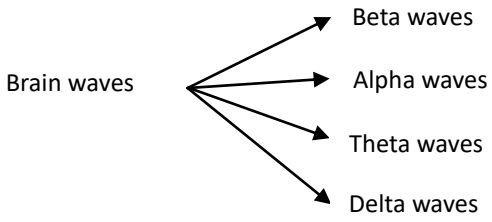
PHYSIOLOGY OF SLEEP

The cyclic nature of sleep is thought to be controlled by centres located in the lower part of the brain. Neurons within the reticular formation, located in the brain stem, integrate sensory information from the peripheral nervous system and relay the information to the cerebral cortex. The part of the reticular formation consists of a network of ascending nerve fibres called the reticular activating system, which is involved in the sleep/ wake cycles. An intact cerebral cortex and reticular information are necessary for the regulation of sleep and waking states. Neurotransmitters, located within neurons in the brain, affect the sleep/ wake cycles. e.g., serotonin is thought to lessen the response to sensory stimulation and gamma amino butyric acid (GABA) to shut off the activity in the neurons of the RAS. Another key factor is exposure to darkness. Darkness and preparing to sleep (e.g. lying down, decreased noise) cause a reduction in stimulation of the RAS. During this time, the pineal gland in the brain begins to actively secrete the natural hormone melatonin, and the person feels less alert. During sleep, the growth hormone is secreted and Cortisol is inhibited.

PHASES OF SLEEP:



BRAIN WAVES



The EEG captures the four types of brain waves that occur during wakefulness and sleep, are measured in cycles per second (cps).

Beta waves

- Occur during daily wakefulness.
- They have the highest frequency and the lowest amplitude, compared to other waves.
- These patterns also show a lot of variability.

Alpha waves

- Occur during wakefulness and periods of relaxation (i.e., during meditation).
- These waves are slower
- Less amplitude and variability than beta waves.

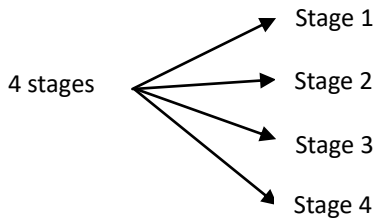
Theta waves

- occur during stages 1 and 2
- Slower in frequency and greater in amplitude than alpha waves
- As the person moves from N1 to N2 sleep, theta wave activity continues; every few minutes, sleep spindles (sudden increase in wave *frequency*) and K-complexes (sudden increase in wave *amplitude*) occur.

Delta waves

- occur during N3 sleep and are
- the slowest waves with the highest amplitude
- Delta sleep is the deepest sleep.

STAGES OF S-SLEEP OR NREM-SLEEP



Stage 1 Light sleep lasts only few minutes.
Drowsy and relaxed
Eyes role from side to side
Heart and respiratory rates drop slightly
Awaken easily

Stage 2	Eye movements stop
	Heart and respiratory rates decrease slightly
	Body temperature falls
	Lasts 10 to 15 minutes
Stage 3	Deepest stages of sleep, differing only in percentage of delta waves
&	
Stage 4	Heart and respiratory rates drop 20 to 30%
	Difficult to arouse
	Skeletal muscles relaxed
	Reflexes diminished
	Snoring
	Swallowing and saliva production reduced
	Lasts 15 – 30 minutes

As the person falls asleep, the person first passes through these stages of NREM-sleep. The EEG recording during the waking state shows alpha waves of 8-12 cycles/ sec. frequency. The onset of sleep is characterised by a disappearance of the alpha-activity.

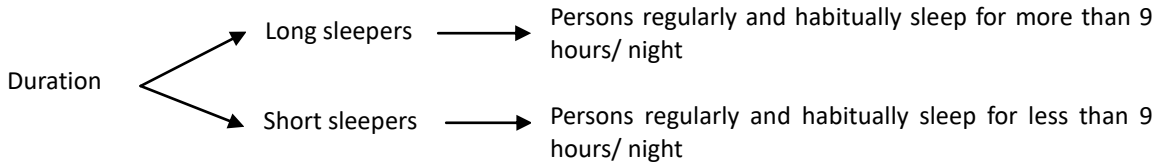
Physiological changes during NREM-sleep

- Arterial blood pressure falls
- Pulse rate decreases
- Peripheral blood vessels dilate
- Cardiac output decreases
- Skeletal muscles relax
- Basal metabolic rate decreases 10 to 30%
- Growth hormone levels peak
- Intra-cranial pressure decreases.

REM SLEEP

- Occurs after 90 minutes of the onset of sleep and lasts 5 to 30 minutes
- Most characteristic feature of REM-sleep is presence of REM or rapid (conjugate) eye movements.
- Vivid, full- colour dreaming occurs
- Generalised muscular atony
- penile erection,
- autonomic hyperactivity - increase in pulse rate, respiratory rate and blood pressure)
- Increased gastric secretion
- movements of small muscle groups, occurring intermittently
- light stage of sleep
- Arousal is difficult.

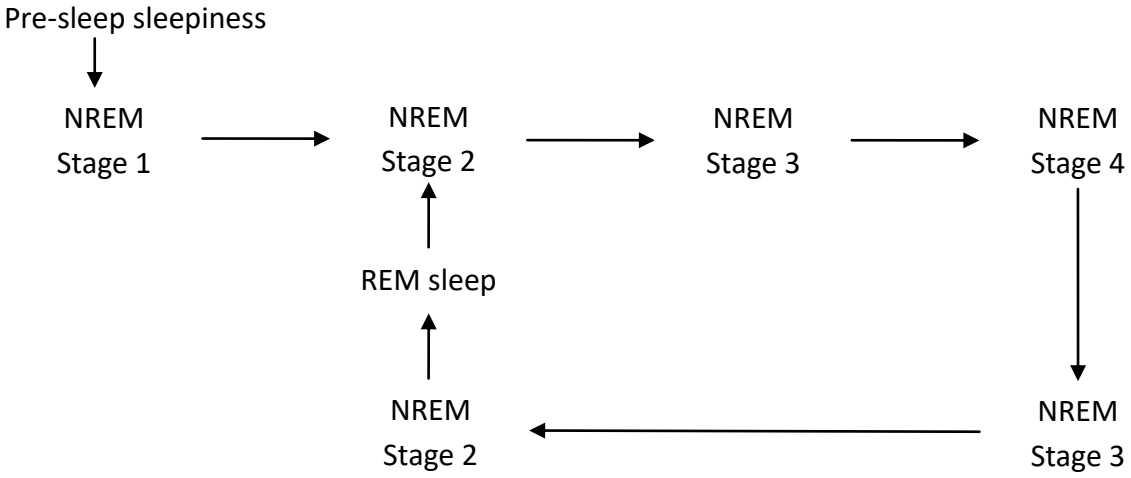
DURATION OF SLEEP



SLEEP CYCLE

An adult's normal sleep pattern begins with a pre-sleep period during which the person is aware only of a gradually developing sleepiness. This period normally lasts 10 – 30 minutes. If a person has difficulty in falling asleep, it lasts an hour or more.

Once asleep, the person passes through 4 or 5 complete sleep cycles per night, each consists of 4 stages of NREM sleep and a period of REM sleep. The cyclical pattern usually progresses from stage 1 through stage 4 of NREM, followed by a reversal from stage 4 to 3 to 2, ending with a period of REM sleep. A person usually reaches REM sleep about 90 minutes into the sleep cycle.



With each successive cycle, stages 3 and 4 of NREM sleep shorten and the period of REM lengthens. REM sleep lasts up to 60 minutes during the last sleep cycle. The number of sleep cycles depends on the total amount of time that the person spends sleeping, in an average of 90 minutes. During a sleep cycle people typically pass through NREM and REM sleep, the complete cycle usually lasting about 90 to 110 minutes.

FUNCTIONS OF SLEEP

Functions of sleep are still far from clear.

- Restores normal levels of activity and normal balance among parts of the nervous system.
- Protein synthesis and cell division for the renewal of tissues occur
- Conservation of energy
- Cognitive restoration
- Restoration of biological processes
- Affect Cardiac function

NORMAL SLEEP PATTERNS AND REQUIREMENTS

The National Sleep Foundation has revised the recommended sleep ranges for all.

Age Group	Age Range	Recommended Hours of Sleep Per Day
Newborns	0–3 months	14–17 hours
Infants	4–11 months	12–15 hours
Toddlers	1–2 years	11–14 hours
Preschoolers	3–5 years	10–13 hours
School Age children	6–13 years	9–11 hours
Teenagers	14–17 years	8–10 hours
Younger adults	18–25 years	7–9 hours
Adults	26–64 years	7–9 hours
Older adults	65 years and older	7–8 hours

FACTORS AFFECTING SLEEP

The quality and quantity of sleep are affected by a number of factors.

The quality of sleep refers to an individual's ability to stay asleep and to get appropriate amount of REM and NREM sleep.

Quantity of sleep is the total time the individual sleeps.

- Illness
- Environmental Factor
- Lifestyles and Habits
- Psychological Stress
- Alcohol
- Dietary Habits
- Smoking
- Motivation
- Culture
- Medications
- Developmental Considerations

IMPORTANCE OF GOOD SLEEP

- Poor Sleep can make you fat
- Good Sleepers tend to eat fewer calories
- Good Sleep can improve concentration and productivity
- Good Sleep can maximise athletic performance
- Poor Sleepers have a greater risk of heart disease and stroke
- Poor Sleep Affects Glucose Metabolism and increased risk of Type 2 Diabetes
- Poor Sleep is linked to depression
- Sleep improves your immune function
- Poor Sleep is linked to increased inflammation
- Sleep affects emotions and social interactions

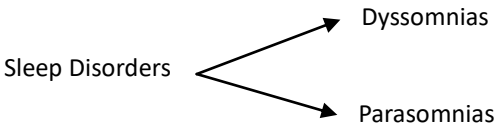
SLEEP DISORDERS

A sleep disorder is characterised by alteration in sleep patterns of a person.

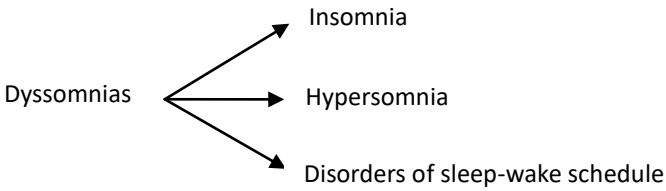
DEFINITION

Sleep disorders are a group of syndromes characterised by disturbance in the patient's amount of sleep, quality or timing of sleep, or in behaviours or physiological conditions associated with sleep.

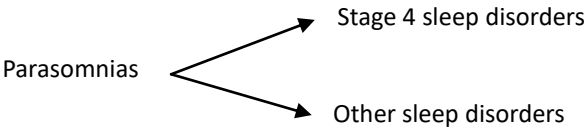
Sleep disorders are known as non-organic sleep disorders in ICD-10.



Dyssomnias:



Parasomnias:



DYSSOMNIAS

Dyssomnias are sleep disorders that are characterised by disturbances in the amount, quality or timing of sleep. These are the commonest disorders of sleep.

a) Insomnia

Insomnia is also known as the Disorder of Initiation and/ or Maintenance of Sleep (DIMS). Insomnia includes:–

i) Frequent awakenings during the night, and

ii) Early morning awakening.

Common Causes of Insomnia

1. Medical illnesses

i. Any painful or uncomfortable condition

ii. Heart diseases

iii. Respiratory diseases

iv. Rheumatic and musculoskeletal disease

v. Old age

vi. Brain stem or hypothalamic lesions

vii. Delirium

viii. PMS (Periodic movements in sleep)

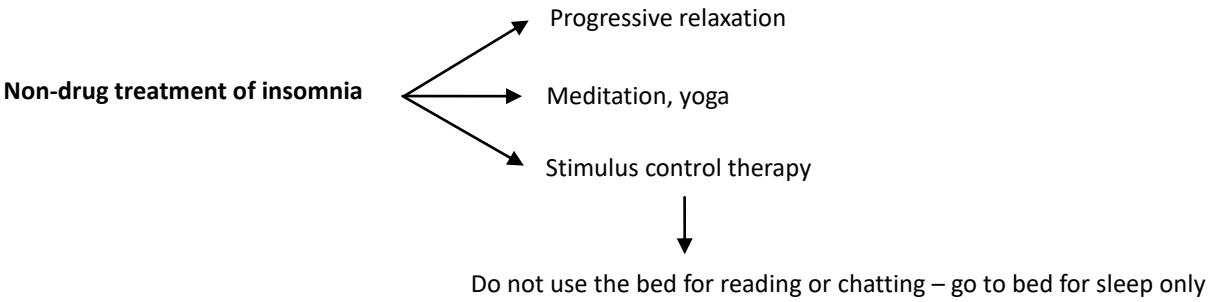
2. ***Alcohol and drug use***
    i. Drug or alcohol withdrawal syndrome
    ii. Delirium tremens
    iii. Amphetamine or other stimulants, e.g. caffeine
    iv. Chronic alcoholism
3. ***Current medication, e.g. fluoxetine, steroids, theophylline, propranolol***
4. ***Psychiatric disorders***
    i. Mania (may not complain of decrease in sleep, as there is often a decreased need for sleep)
    ii. Major depression (difficulty in maintenance of sleep is more prominent, although difficulty in initiating sleep is also present) (early morning awakening or late insomnia)
    iii. Dysthymia (difficulty in initiating sleep or early insomnia)
    iv. Anxiety disorder (difficulty in initiating sleep due to worrying thoughts)
    v. Stressful life situation (may cause temporary insomnia).
    vi. Schizophrenia and other psychoses (due to psychotic symptoms)
5. ***Social causes***
    i. Financial loss
    ii. Separation or divorce
    iii. Death of spouse or a close relative
    iv. Retirement
    v. Stressful life situations
6. ***Behavioural causes***
    i. Naps during the day
    ii. Irregular sleeping hours
    iii. Lack of physical exercise
    iv. Excessive intake of beverages in the evening
    v. Disturbing environment (heat, cold, noise etc.)
7. ***Idiopathic insomnia***

Treatment

a. A thorough medical and psychiatric assessment.
b. Polysomnography may be needed in some cases.
c. Treatment of the underlying physical and/ or psychiatric disorder.
d. Withdrawal of current medications, if any.
e. Relaxation techniques before sleep time and education regarding sleep hygiene. Sleep hygiene consists of general guidelines for promoting good sleep.

Sleep hygiene

a. Regular, daily physical exercises (preferably not in the evening).
b. Minimise daytime napping.
c. Avoid fluid intake and heavy meals just before bed- time.
d. Avoid caffeine intake (e.g., tea, coffee, cola drinks) before sleeping hours.
e. Avoid regular use of alcohol (especially avoid use of alcohol as a hypnotic for promoting sleep).
f. Avoid reading or watching television while in bed.
g. Sleep in a dark, quiet, and comfortable environment.
h. Regular times for going to sleep and waking-up
i. Try relaxation techniques.



b) Hypersomnia

Hypersomnia is also known as Disorder of excessive somnolence (DOES). Hypersomnia means one or more of the following:

1. Excessive day time sleepiness.
2. 'Sleep attacks' during day time (falling asleep unintentionally).
3. 'Sleep drunkenness' (person needs much more time to awaken; and during this period is confused or disoriented).

Aetiology

The common causes of hypersomnia are listed below:

1. Medical illnesses

i. Narcolepsy (in about 25% of all patients with hypersomnia)
ii. Sleep apnoea (in about 50% of all patients with hypersomnia)
iii. Kleine-Levin syndrome
iv. Menstrual-associated somnolence
v. Sleep deprivation
vi. Following or with insomnia
vii. Encephalitis
viii. Hypothyroidism
ix. Head Injury
x. Cerebral tumours in the region of mid-brain
xii. PMS (Periodic movements in sleep); in about 10% of all patients with hypersomnia.

2. Alcohol and drug use

i. Stimulant withdrawal
ii. Alcohol intoxication
iii. Use of CNS depressant medications.

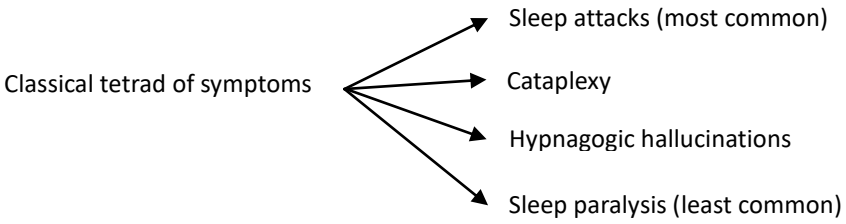
3. Psychiatric disorders

i. Dysthymia
ii. Atypical depression
iii. Seasonal mood disorder.

4. Idiopathic hypersomnia.

A few important causes of hypersomnia are discussed below:

1. Narcolepsy:— Disorder characterised by excessive day-time sleepiness



2. Sleep Apnoea: — Repeated episodes of apnoea during sleep.
3. Kleine-Levin Syndrome: — Periodic episodes of hypersomnia.

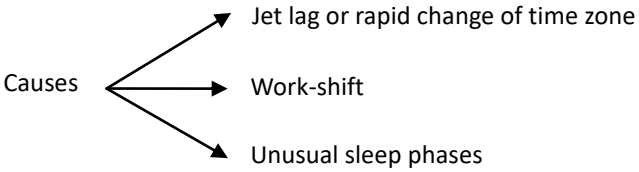
Treatment

1. A thorough physical and psychiatric assessment.
2. Treatment of the underlying cause is the most important method.
3. Associated or underlying insomnia should be looked for and treated.
4. Withdrawal of current medication causing Hypersomnia
5. Benzodiazepines at night may paradoxically decrease hypersomnia by correcting night time insomnia.

c) Disorders of Sleep-wake Schedule

These are characterised by a disturbance in the timing of sleep. The person with this disorder is not able to sleep when he wishes to, although at other times he is able to sleep adequately.

Aetiology



Treatment

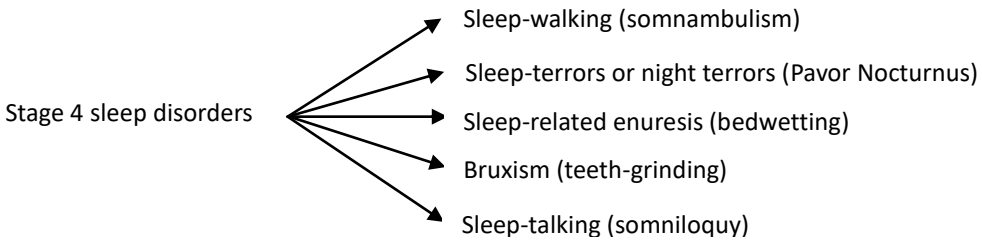
- No specific treatment is usually needed.
- Benzodiazepines - for short-term correction of insomnia.

PARASOMNIAS

The person frequently wakes during sleep.

a) Stage 4 Sleep Disorders

Occur during deep sleep, i.e., Stages 3 and 4 of NREM-sleep.

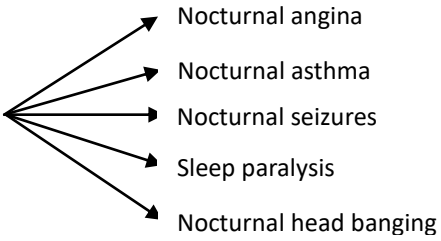


1. ***Sleep-walking (somnambulism):***
   - The patient carries out automatic motor activities that range from simple to complex.
   - He may leave the bed, walk about or leave the house.
   - Arousal is difficult and accidents may occur during sleep-walking.
2. ***Sleep-terrors or night terrors (Pavor Nocturnus):***
   - The patient suddenly gets up screaming with autonomic arousal (tachycardia, sweating and hyperventilation).
   - Difficult to arouse and rarely recalls the episode on awakening.
   - In contrast, nightmares (which occur during REM- sleep) are clearly remembered in the morning.
3. ***Sleep-related enuresis (bedwetting)***
4. ***Bruxism (teeth-grinding)***
   - The patient has an involuntary and forceful grinding of teeth during sleep.
   - The patient remains completely unaware of the episode(s).
5. ***Sleep-talking (somniloquy)***
   - The patient talks during stages 3 and 4 of sleep but does not remember anything about it in the morning on awakening.

Treatment

Benzodiazepines — single dose at bedtime

b) Other Sleep Disorders



Treatment

No specific treatment.

CONCLUSION

Sleep is essential to our overall health and well-being. Sleep is the time for the general body and brain to shut down and rest. A “good night’s sleep” can cure problems with excessive daytime sleepiness. A sleep disorder is characterised by alteration in sleep patterns of a person. Sleep disorders are a group of syndromes characterised by the disturbance in the patient's amount of sleep, quality or timing of sleep, or in behaviours or physiological conditions associated with sleep. World Sleep day is celebrated every year and this year it was on 17thMarch 2017. The theme was “Sleep soundly, Nurture Life.”

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