

Drugs and Dreams

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ABSTRACT

Dreams are a series of images, ideas, thoughts, emotions and sensations occurring involuntarily in the mind during certain stages of sleep. They have been described physiologically as a response to a neural process when the person is asleep while the psychological basis proposed is that they are because of reflection of the subconscious mind. Pharmacologists are of the view that medications, many hormones, neurotransmitters, herbs and supplements can alter dreams and make them more or less vivid.

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Dreams are a series of images, ideas, thoughts, emotions and sensations occurring involuntarily in the mind during certain stages of sleep.¹ The content and purpose of dreams are not fully understood although they have been a topic of interest since ages. The scientific study of dreams is known as oneirology.¹

Dreams have a long history. They have been a subject of controversy and disagreement as different individuals have tried to describe in their own manner. They have been described physiologically as a response to a neural process when the person is asleep while the psychological basis proposed is that they are because of reflection of the subconscious mind. The spiritual people ascribe them to as messages from Gods. Pharmacologists are of the view that medications, many hormones, neurotransmitters, herbs and supplements can alter dreams and make them more or less vivid.²

Dreams can be of various forms i.e., pleasant dreams or frightening dreams. Frightening dreams can be either in the form of a nightmare or a night terror. A nightmare is a type of dream that arouses feelings of intense,

inescapable fear, terror, distress or extreme anxiety that usually awakens the sleeper. It results in the dreamer waking with full or partial recall of the dream itself. Recurrent nightmares can be because of post-traumatic stress disorders or due to other psychiatric illnesses. Nightmares are more common in women and are associated with an increase in nocturnal awakenings, sleep-onset insomnia and day time memory impairment and anxiety following poor sleep.³ Night terror is an arousal disorder that usually occurs early in the sleep period. It is an episode of extreme fright during sleep without any recollection of a dream. Both nightmares and night terrors strike children much more often than adults.³

SLEEP PATTERNS AND DREAMS

As indicated by Davidson, Duffy and Osselton, sleep may be divided into two alternative phases: Rapid eye movement (REM) sleep and nonrapid eye movement (NREM) sleep. Although, dreams can occur in both the phases, they primarily take place in the REM phase which is associated with low-voltage electroencephalogram (EEG).⁴ NREM sleep is further divided into four stages (stage 1 to stage 4). Stage 3 and 4 constitute the deep sleep. It is reported that 80% of persons have dreams during REM sleep and sleep onset (stages 1 and 2), while 20% persons have dreams during deep sleep.⁵ Patients report that dreams experienced during REM sleep tend to be bizarre and detailed, with storyline plot associations. Unpleasant or frightening dreams usually occur in this period. In contrast, dreams experienced in deep sleep are more diffuse (e.g., dreams about a color or an emotion). Night terrors may occur at this time. The dreams of stages 1

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and 2 are simpler, shorter and have fewer associations than the dreams of REM sleep.⁵ These phases of sleep, especially REM sleep, can be affected by a variety of drugs and hormones.⁶

A number of drugs used in various diseases can affect the sleep pattern and can cause dreams. Nightmares including night terrors are also associated with the use of medications, which affect the neurotransmitters e.g., adrenergic, cholinergic, dopaminergic, serotonergic and gabaminergic, etc. It has been observed that almost all psychiatric drugs can influence our dreams but even medications that would not seem suspect, such as drugs affecting blood pressure, may have an effect, some of them reducing nightmares and some increasing them. Individual differences are of course always possible. It is not only the drugs used in pharmaco-therapeutics that lead to dreams, even drugs of abuse can be responsible for change in sleeping pattern and dreams.²

Pharmacotherapeutic Drugs and Dreams

Prescriptions drugs used in various disease states can alter sleeping patterns leading to dreams by affecting one or the other neurotransmitters. Drugs influencing adrenergic, aminergic, dopaminergic and cholinergic neurotransmitters have a prominent role in dreams and nightmares.⁷ These neurotransmitters may function by modulation of the cardinal sleep stages - REM and NREM sleep.⁸

Antihypertensive Agents

Antihypertensive agents, in general use, affect adrenergic receptors. β -blockers and adrenergic neuron blocking agents are responsible for 34% of clinical trials in which nightmares are reported as an adverse effect.⁸ β -blockers which cause nightmares or dreams are: Propranolol, atenolol, betaxolol, bisopropolol and labetalol. They are known to be NREM suppressants. Adrenergic neuron blockers-guanethidine, and reserpine have probable association with nightmare reports. These drugs have been shown to affect REM sleep and thus cause dreams. Decrease in dream recall occurs with the use of both adrenergic neuron blockers (REM suppressant) and β -blockers (NREM suppressants).⁹ Other antihypertensive agents that may cause dreams are angiotensin-converting enzyme inhibitors (captopril, enalapril and quinapril), angiotensin receptor blocker (losartan) and calcium channel blocker (verapamil).⁸

Hypolipidemic Agents

Nightmares may also be a rare class effect of the statins: Simvastatin, pravastatin, fluvastatin and atorvastatin, which may be linked to REM sleep suppression.⁸

Drugs used in Alzheimer's Disease

REM sleep is affected by pharmacological alteration of cholinergic activity in the central nervous system (CNS).⁸ Many lines of study support the hypothesis that brainstem cholinergic neurons can be excited to induce REM sleep.¹⁰ Cholinergic agents (anticholinesterases) such as donepezil, rivastigmine and tacrine are likely to increase the percentage of REM sleep, while cholinergic antagonists have a tendency to decrease REM sleep.¹¹ Anticholinesterases affecting acetylcholine neuroreceptor system thus have a possible association with drug-induced nightmares. Memantine, which is a N-methyl-D-aspartate (NMDA) receptor antagonist, may cause surreal or unpleasant dreams, sometimes nightmares.²

Antidepressants Agents

All drugs that alter serotonin levels may affect sleep and dreaming. This effect is greatest for the monoamine oxidase inhibitors (MAOIs) followed by tricyclic antidepressants (TCAs) and selective serotonin reuptake inhibitors (SSRIs).¹² Intense visual dreaming and nightmares are associated with clomipramine; REM sleep rebound occurring after the withdrawal of these REM sleep suppressant agents.¹³ Fluoxetine, citalopram, as well as atypical antidepressant mirtazapine can also cause very peculiar, sometimes disturbing dreams.²

Antipsychotics Agents

Antipsychotic (neuroleptic) drugs e.g.; chlorpromazine, thiothixene and clozapine can increase vividness of dream but often decrease dream recall.²

Antiparkinsonian Drugs

Dopamine receptor stimulation may be another common mechanism resulting in drug-induced nightmares. Dopamine agonists - levodopa, bromocriptine, pergolide, amantadine, selegiline and rasagiline, used to treat Parkinson disease may cause vivid dreams, sometimes of sexual nature.¹⁴

Antiepileptic Drugs

Drugs known to affect the gamma-aminobutyric acid (GABA) receptor (agonist, modulators and reuptake

inhibitors) can cause nightmares and abnormal dreaming. Gabapentin, valproic acid and tiagabine are few examples related to GABA neurotransmitter. Other antiepileptics like lamotrigine and ethosuximide also cause dreams.¹⁵

Sedative Hypnotic Drugs

Nightmares and intense dreaming have been associated with the REM sleep rebound associated with withdrawal from REM sleep suppression agents such as barbiturates. Benzodiazepines (diazepam, flunitrazepam, nitrazepam) and nonbenzodiazepine hypnotic, zolpidem can also induce dreams and night terrors by increasing REM sleep.¹⁶

General Anesthetic Agents

These agents may also induce nightmares. An increased incidence of pleasant dreams is reported with use of propofol,¹⁷ while thiopental, midazolam, isoflurane and ketamine have been reported to produce disordered dreaming and nightmares.¹⁸

Antihistamine Drugs

Chlorpheniramine has been reported to induce nightmares suggesting a potential role for histamine as a modulator of dreaming.¹⁹

Antimicrobial and Immunosuppressant Agents

Viral and bacterial infections can be associated with large increase in NREM sleep. In some studies, several agents like fleroxacin, erythromycin and ciprofloxacin, which are used for the treatment of bacterial infections, are reported to induce nightmares.¹⁹ Antiviral agents such as ganciclovir and amantadine may also lead to dreams. Even gusperimus, which is an immunologic response suppressant, is also reported to induce nightmares.⁷

Analgesic Drugs

People taking opioids as painkillers (morphine, buprenorphine) often report vivid dreams especially in the beginning of their use. Nonopioid pain killer, naproxen may also affect dreams.²

Endocrinal Agents

The hormones dehydroepiandrosterone (DHEA) and testosterone may cause nightmares if the dose is too large.²

Miscellaneous Drugs

Other drugs modulating the various neurotransmitters i.e., orexin, adenosine, histamine, glycine, glutamate,

nitric oxide and neuropeptides may also be associated with varied dreams.²⁰ Riluzole and dextromethorphan, which are NMDA receptor antagonists may lead to unpleasant dreams, sometimes nightmares. Drug used for smoking cessation i.e., varenicline which is a nicotine receptor partial agonist may also be responsible for nightmares.²

Herbal Drugs

Many herbal drugs influence dreaming, especially those with psychotropic effects like Kava-Kava, St. John's Wort, Valerian, Licorice root, Jasmine, Lavender, Cardamom, *Ginkgo biloba*, Cinnamon, Marigold, Nutmeg, Peppermint and Passion flower. The Ayurvedic herb Ashwagandha is also well-known for creating surreal dreams.²

DRUGS OF ABUSE AND DREAMS

There are many drugs, such as opium, cocaine, cannabis, coal tar products and alcohol, which have an abuse potential and may have an influence upon dreams. Dreams caused by such drugs are, however, influenced by the physiological action of the drug taken, the amount used, the idiosyncrasies of the individual and the mentality. Drugs as opium and cocaine, when taken in medicinal doses, produce a sense of well-being and comfort and so tend to promote pleasurable fancies. These drugs, when taken in sufficient doses, cause sleep dreams which are not remembered. Many persons are much distressed by these drugs and others, in place of awaking refreshed, awake tired and dimly conscious of disturbing dreams.²¹

CNS stimulant drugs e.g., amphetamines and caffeine may also lead to dreams. Amphetamines are associated with vivid and unpleasant dreams whereas caffeine has been used to induce lucid dreaming, because it makes one sleep lighter.²²

Dreams are, thus, reflections of the subconscious mind and are caused by a variety of pharmacological agents. These agents act via a variety of neurotransmitters i.e., adrenergic, cholinergic, dopaminergic, serotonergic and gabaminergic, etc. These drugs are either pharmacotherapeutic drugs prescribed for the treatment of various diseases or are the drugs of abuse. These drugs may be responsible for causation of dreams, which are either pleasant in nature or may be in the form of nightmares.

From the clinician's point of view, various strategies can be adopted for the management of varied types

of dreams especially nightmares and night terrors. Of foremost importance is the behavioral therapy. Nightmares and night terrors are usually disturbing to family members; therefore, proper diagnosis and education of family members are important components of management. Dream disorders may respond to medication e.g., fluoxetine for post-traumatic stress disorder, clonazepam for night terrors³ and benzodiazepines for ketamine²³ induced dreams but behavioral treatment approaches in the form of reassurance and support have shown excellent results, particularly in patients with post-traumatic stress disorder and recurrent nightmares. This therapy reduces the incidence of nightmares in about 70% of patients. If the patient is still not relieved, changing the suspect agent with a suitable alternative or withdrawal of the drug may help. In spite of all the above mentioned treatment strategies, there is still controversy as to what is the best option for the patient and thus research is going on to find the best approach.

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