



## A Review on Drug Addiction

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### ABSTRACT:

Addiction significantly affects a person's body and brain. When a person consumes drugs, their brain creates a lot of dopamine, which activates their reward system. However, after employing drugs repeatedly, their brain loses its ability to manufacture dopamine, which causes cravings and compulsive drug usage. Addiction is described as a recurring cycle consisting of three stages: pre-occupational/anticipation, negative affect/withdrawal, and binge/intoxication. Each stage corresponds to a certain brain region and causes alterations in the brain. Usually, it signifies an overwhelming need to use the drug, a rise in tolerance to the drug, and withdrawal symptoms after stopping use. Opioids, cannabinoids, stimulants, and hallucinogens are among the substances that cause compulsive drug use in substance use disorders, often known as addict-forming drugs. Addiction has a major negative influence on our relationships, general quality of life, and health. Drug addiction is managed and treated with a variety of therapy, a rehabilitation facility, and life-improving drugs.

Key Words: Drug addiction, Heroin, Marijuana, Cocaine, LSD (lysergic acid diethylamide)

### Introduction:

The definition of addiction is a chronic, recurrent condition marked by obsessive drug seeking and usage despite negative outcomes. Substance use disorder, another name for drug addiction, is an illness that affects a person's brain and behaviours and causes them to become unable to regulate their use of drugs or medications, whether they are legal or not. Addiction to drugs on repeatedly can alter brain chemistry and cause addiction. Because it causes functional alterations to the brain circuits responsible for reward, stress, and self-control, it is regarded as a brain condition. Drug addiction is regarded as relapsing because the neurological changes caused by addiction can be permanent. This implies that even after years of abstinence from drugs, those in recovery run the risk of doing so.

### Addiction and brain:

Addiction is largely influenced by the brain, with the prefrontal cortex playing a crucial role in drug decisions. The drug stimulates the nucleus accumbent, a group of nerve cells beneath the cerebral cortex, to release a large amount of dopamine, a neurotransmitter that powers motivation. Dopamine-induced pleasure is likely developed to promote recurrence of actions that contribute to survival, such as eating and socializing

The overstimulation of the brain's pleasure pathways can result in addiction, which can be persistent and even lifelong. Eating behaviours are reinforced by the reward system, a primitive component of the brain. Addicting chemicals like opioids, cocaine, or nicotine cause an overpowering response in the brain that alters as a substance is consumed.

These medications dominate the reward system, leading the brain to identify the euphoria as coming from the drug. The brain's circuits grow less responsive to dopamine with time, which causes tolerance to accumulate and increases the amount of substance required to get the desired high. Problems with focus, memory, learning, decision-making, and judgment can also result from addiction, leading to drug use that is motivated by habit rather than deliberate, thoughtful choices.

The brain's parts responsible for addiction include the nucleus accumbent, dopamine neurons, amygdala, and the hippocampal, which are responsible for the cravings and the overactivation of reward and motivation circuits. And the hippocampus, which are in charge of the overactivity of the reward and motivation circuits as well as the cravings.



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### Stages of addiction:

Addiction be described as a repeating cycle with three stages. Each stage is particularly associated with brain regions —basal ganglia, extended amygdala, and prefrontal cortex. These stages are based on different brain regions, circuits, and neurotransmitters, and result in specific changes in the brain.

#### 1. Binge /Intoxication stage –

A person who consumes drugs and enjoys the feeling of being high or euphoric is said to be in the binge/intoxication stage. At this point, drugs activate the dopaminergic pathway in the brain, which starts in the basal ganglia. This results in a powerful rush of pleasure. Excessive consumption raises the risk of overdosing by intensifying the effects of a hangover to dangerous levels.

#### 2. Negative affect/Withdrawal –

After the intoxication stage, when people cease using drugs and experience withdrawal symptoms, comes the withdrawal/negative consequence stage. This phase is linked to the activation of the amygdala, or stress system, in the brain, which occurs when the basal ganglia's reward system shuts down. As a result, the addict becomes caught in a vicious cycle where they try to get back to the euphoric state in order to feel good and deal with their withdrawal symptoms.

#### 3. Preoccupation/Anticipation –

When a person starts to experience drug cravings in the third stage of addiction, the prefrontal cortex—which is in charge of planning and decision-making—begins to function. Following a time of drug abstinence, this stage begins, activates the brain's "go system," and when resuming drug use, returns the user to the intoxicated state. Addiction symptoms include intense cravings that don't go away, an overwhelming need to take the drug of choice, and warning indicators including anxiety, fatigue, disappointment, and trouble focusing.

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### Factors increasing risk of addiction:

Addiction is a growing concern due to various factors, including genetics, mental health conditions, environmental factors, substance nature, medication administration, early use, and prescription drugs.

#### 1. Genetics –

It accounts for 40% to 60% of the vulnerability to substance abuse disorder (SUD), with first-degree relatives having a higher risk.

#### 2. Mental health –

It includes conditions like depression, PTSD, and bipolar disorder are strongly linked to addiction, with about half of those experiencing these conditions also experiencing a substance abuse disorder (SUD).

#### 3. Environmental factors –

It includes substance accessibility, adverse childhood events (ACEs), and the substance's nature. Certain substances, like heroin, crack, or nicotine, have specific ingredients or activate bodily receptors that cause addictive reactions. Experiencing a substance just once can initiate a pattern of actions leading to addiction.

#### 4. Medication administration –

It increases the potential for addiction when smoked or injected intravenously, providing a strong rush of pleasure but potentially passing quickly.

#### 5. Early use of drugs –

It is more likely due to negative effects on the growing brain and a combination of early social and biological risk factors.

#### 6. Prescription drugs –

It includes drug such as benzodiazepines, can result in addiction if used for long periods, while benzos disrupt the dopamine system, leading to addictive behaviours over time. Medical experts recommend using these drugs only for short periods to avoid developing tolerance and misuse.

In conclusion, addiction is a complex issue influenced by genetics, mental health conditions, environmental factors, substance nature, and medication administration. Understanding these factors and their impact on addiction prevention and treatment is crucial for addressing this growing issue.

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### Symptoms of drug addiction:

Drug addiction can manifest in various physical, psychological and behavioural ways, including

#### ➤ Physical symptoms –

frequent runny noses, seizures, lethargy, Odors, pinpoint pupils, weight changes, eating habits, sleep patterns, and poor hygiene.

➤ Psychological symptoms-

depression, anxiety, paranoia, mood swings, cognitive changes, overconfidence, obsession with drugs, hallucinations, psychosis, aggression, personality traits, lack of motivation, and disinterest.

➤ Behavioural symptoms –

changes in activities, social circles, family participation, poor performance, lying, legal issues, secretive behaviours, self-isolation, risk-taking, and prioritizing drug use.

#### **4'C of Addiction:**

The four elements of addiction where each “C” defines a component behind the complexity of addiction: Consequence, Craving, Compulsion, and Control. They are a simple but effective way to better understand the complexities of drug use. Using these four concepts can help you navigate the challenges of addiction and find the right treatment plan to overcome it.

1. Compulsive –

Compulsive behaviour is a condition where individuals have an intense need to act despite potential consequences, often leading to unhealthy behaviours like drug use or certain activities. This behaviour is linked to changes in the brain's reward system, which releases dopamine, responsible for pleasure and reward. Over time, exposure to addictive substances or actions can make the brain's reward system habituated, reducing sensitivity to external rewards and increasing reliance on addictive behaviour. Psychological factors like trauma, stress, and anxiety can also contribute to addiction development.

2. Craving –

It is the intense urge to take a substance or engage in an action, a major aspect of addiction. It can be physical or psychological, driven by the body's need for the substance or pleasure. Cravings can range from mild to overwhelming, and can occur in cycles, making addiction recovery challenging.

3. Consequence –

Addiction is a pattern of continuous use or participation in addictive behaviour, resulting in financial, social, psychological, and physical consequences. These consequences can negatively impact a person's health, including physical health issues, mental health, relationships, financial consequences, and legal consequences. Physical effects include substance-related health issues, mental health issues, and isolation. Social consequences include struggled friendships, financial consequences, and legal consequences, such as arrests and convictions.

4. Loss of control –

Addiction often leads to a loss of control over substance usage or addictive behaviours. This is due to changes in the prefrontal cortex, responsible for impulse control and decision-making, which becomes less effective as addiction progresses. This leads to increased impulsivity and decreased self-control, making recovery a crucial step.

#### **Various routes of administration of addictive drugs:**

1. Oral administration -

It involves ingesting a substance, drinking a beverage, or swallowing pills, with the majority of the drug being absorbed in the small intestine. The first-pass effect, also known as "first pass metabolism," reduces the amount of medication entering the bloodstream.

Examples - cannabis, painkillers, and club drugs like ecstasy and MDMA.

2. Injection –

It is the fastest method of getting high from addictive substances, as it directly enters the bloodstream. Intravenous (IV) injections introduce drugs directly into the bloodstream, while subcutaneous injections allow chemicals to enter the bloodstream through fatty tissue beneath the skin.

Examples - heroin, steroids, prescription medications, barbiturates, benzodiazepines, cocaine, methamphetamine, and crack cocaine.

3. Snorting drugs –

It is also known as nasal insufflation, delivers drugs quickly to the brain, bypassing the digestive system and liver.

Examples - benzodiazepines, cocaine, heroin, ketamine, MDMA, methamphetamine, phencyclidine, prescription opioids, stimulants, and synthetic cathinones.

4. Inhalation –

It including smoking, produces an extremely rapid high and dissipates quickly. Smoking an addictive substance takes advantage of the internal lining of the lungs to release drugs into the bloodstream faster, causing less oxygen absorption and potentially damaging organ systems.

Examples - tobacco, marijuana, crack cocaine, opioids, meth, and some prescription drugs.

#### 5. Transdermal administration –

It is less frequently abused than injection or oral administration, as it involves applying a patch to the skin, allowing the medicine to enter the bloodstream and travel throughout the body.

Example – Fentanyl patch

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### Addiction forming drugs:

#### *Heroin:*

The illegal and extremely addictive opioid narcotic heroin is produced by morphine, which is obtained from the seedpod of opium poppy plants. It involves a psychoactive, pain-relieving medication that causes both physical and psychological reliance. Heroin is a potent opioid due to its quick absorption into the brain and effect on the reward system, which results in strong feelings of pleasure and euphoria.

- Synonyms – horse, shit, brown, dimorphine
- Ways to use heroin- Through injection, sniffing, snorting, smoking, or "speed balling" with crack cocaine,
- Signs of heroin addiction - Severe cravings, withdrawal symptoms, disrespect to obligations, and persistent usage despite unfavourable effects are indicators of heroin addiction.
- Effects of heroin addiction - depression, insomnia, erectile dysfunction, menstrual cycle disruptions, unconsciousness, blood poisoning, malnutrition, weakened immune system, skin and dental complaints, collapsed veins, constipation, liver and kidney disease, heart valve infections, pneumonia, and an increased risk of HIV.
- Treatment-medically assisted detox is followed by heroin rehabilitation, use of behavioural therapy to help recover from heroin addiction.



#### *Cannabis:*

Cannabis use disorder, another name for marijuana addiction, is the incapacity of an individual to limit their marijuana usage despite its negative effects. THC, or delta-9 tetrahydrocannabinol, is the active ingredient in cannabis, commonly referred to as marijuana, which has psychedelic effects. Dopamine is a neurotransmitter that regulates sensations of reward and pleasure. Cannabis enhances this neurotransmitter's synthesis. Because of the excess dopamine in their system, users feel that abusing cannabis will extend its effects.

- Synonyms – Ganja, herb, grass, hash, marijuana weed
- Ways to use marijuana- it can be rolled up and smoked like a cigar or cigarette, mixed into food and eaten, boiled as a tea, or vaporized using an electronic device.
- Signs of marijuana addiction-Increasing tolerance, using marijuana more frequently or in bigger doses and trying in vain to reduce or manage marijuana use.
- Effects of marijuana - panic attacks, hallucinations, psychosis, increased heart rate, and brain damage during adolescence or young adulthood. It led to impaired sperm development, which can affect fertility.
- Treatment- options for marijuana addiction include behavioural therapy, support groups, and medication for symptoms like anxiety or depression.



**Cocaine:**

A psychological and physical reliance on cocaine, a strong stimulant substance made from the leaves of the coca plant, is known as cocaine addiction. Dopamine levels in the brain rise as a result, producing strong euphoric feelings. As a result of the brain's adaptation to cocaine's effects, dependency and tolerance develop.

- Synonyms – coca, coke, snow, crack, soda cot
- Ways to use cocaine- sniffing, rubbing, injecting, or mixing it with heroin
- Signs of cocaine addiction- Increased tolerance, taking risks, going through withdrawals, and having unsuccessful attempts to stop use.
- Effects of cocaine - elevated body temperature, heart rate, blood pressure, and constricted blood vessels. The neurological side effects include coma, seizures, migraines, and strokes. Abdominal pain and nausea, lung damage, collapsed lung, pneumonia, emphysema, respiratory failure, and exacerbated asthma are examples of gastrointestinal problems. Additionally, pulmonary enema increases the chance of hepatitis, HIV, and other infectious disorders.
- Treatment-Behavioural therapy, support groups, inpatient and outpatient rehab, and medication to treat co-occurring mental health conditions are all available as forms of treatment for cocaine addiction.

**LSD (lysergic acid diethylamide)**

LSD (lysergic acid diethylamide) is a mind-altering drug that disrupts communication between chemical networks in the brain, affecting behaviour, mood, senses, and thinking. It belongs to the psychedelics group and can cause mild changes in perception, mood, and thought. LSD is odourless, colourless, and tasteless, and addiction is a form of hallucinogen addiction. Unlike opioids or alcohol, LSD does not cause physical dependence.

- Synonyms – acid, sugar cubes, white lightning
- Way to use LSD – It can be painted onto small squares that people lick or swallow.
- Signs of addiction - include significant effort in acquiring, using, or recovering from LSD use, continuing to use LSD despite health issues, using it in larger amounts or over a longer period, engaging in risky behaviours, and feeling that LSD is necessary for creativity or socializing.
- Effects of addiction - LSD can exacerbate mental health issues, trigger Hallucinogen Persisting Perception Disorder (HPPD), cause cognitive impairments, cause emotional instability, and lead to physical risks.
- Treatment for LSD addiction primarily involves psychological interventions, including detox, evidence-based therapies, and cognitive-behavioural therapy (CBT).

**Effects of Drug Addiction:**

Drug addiction can have significant impacts on various bodily systems, including the cardiovascular system, respiratory system, immune system, endocrine system, kidneys, liver, gastrointestinal system, mental health, nausea, stomach discomfort, and the unborn child.

1. Cardiovascular system –

It is affected by stimulants like cocaine and heroin, which can lead to heart attacks, strokes, chronic heart disease, and even heart failure. The respiratory system is affected by medications like alcohol, cocaine, amphetamines, benzos, and opioids, which can harm the lungs, leading to conditions like chronic bronchitis, lung cancer, and emphysema. Smoking tobacco and marijuana increases the risk of lung illness and cancer.

2. Immune system –

It is also affected by drug addiction, with certain chemicals inhibiting the immune system's cells and causing HIV/AIDS. The endocrine system is affected by hormonal processes, with substances misuse playing a role in impotence, infertility, pancreatitis, abnormal menstrual periods, and poor libido.

3. Kidney damage –

It is another consequence of drug addiction, with medications potentially harming kidneys over time, leading to potentially fatal renal failure. Liver damage can result from heroin and prescription painkillers, with severe substance abuse resulting in Hepatitis B and C.

#### 4. Gastrointestinal damage –

It is also a concern, with opioids causing heartburn, reflux, ulcers, diarrhoea, and constipation. Severe substance addiction can lead to intestinal punctures and chronic digestive problems.

#### 5. Mental health –

It is also affected by drug addiction, with issues with memory, focus, hallucinations, and decision-making making daily living more challenging. Nausea and stomach discomfort are common side effects of medication due to its toxic nature.

#### 6. Pregnancy-related –

Drug addiction can lead to premature delivery, stillbirth, mother death, and neonatal abstinence syndrome (NAS) in offspring.

#### 7. Impact on Brain --

Drug addiction leads to impaired cognitive function, reduced capacity for thought, memory alterations, and changes in brain connections. It affects glutamate, a neurotransmitter involved in the reward system, making it harder to think and learn. The environment can also trigger an individual's instinctive desire for drugs. Drug misuse affects other brain sections, physically altering neuron connections, leading to increased connections in certain areas and reduced connections in others. Additionally, many medications can destroy brain tissue, causing irreversible damage and cell degeneration.

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### Treatment of drug addiction:

#### 1. Medication –

Drugs like methadone, buprenorphine, and naltrexone can be used to treat addiction to opioids, tobacco, and alcohol.

#### 2. Medical detoxification--

The goal of medical detoxification is to eradicate drugs from an addict's body entirely while controlling any negative psychological and physical repercussions. Weeks or days may pass between courses.

#### 3. Inpatient and residential rehabilitation programs –

It offers structured care plans and supervised treatment for individuals recovering from addiction. These programs typically last for weeks to months, with licensed professionals monitoring patients seven days a week.

#### 4. Outpatient rehabilitation -

It allows patients to live at home or in a recovery facility while completing therapy, providing flexibility for those unable to work or care for their children. Each week, clients attend multiple group sessions led by certified specialists in a secure, clinical setting.

#### 5. Behavioural therapy --

The goal of behavioural treatment is to modify compulsive overuse of substances by altering the surrounding circumstances.

- Cognitive behavioural therapy (CBT) seeks to change maladaptive thought processes, increase self-efficacy, and comprehend the behaviours of others.
- Concurrent management encourages sobriety by rewarding clients for making improvements in their life.
- Motivational interviewing therapy are more committed to changing because they are able to identify their inner motivations and values.
- Family therapy treats interdependent relationships and drug abuse issues while addressing co-occurring difficulties and concerns within a family. By emphasizing the individual's motivation and change goals, both approaches seek to assist people in overcoming addiction.

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### Conclusion:

Drug addiction results in compulsive drug use, which alters the brain's reward system and ultimately alters how the brain functions. 4<sup>th</sup> of Addiction it is an effective way to better understand the complexities of drug use. Using these four concepts can help navigate the challenges of addiction and find the right treatment plan to overcome it. Addiction can be treated with a variety of medication, behavioural therapy, and rehabilitation facilities that enhance people's quality of life.

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