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# DRUG ADDICTION AND REHABILITATION

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## Abstract:

Rising trend in use of addictive drugs is worrisome and needs serious attention. Most common examples of drug use include alcohol, cannabis, opioids, nicotine, psychostimulant drugs and hallucinogens. Positive reinforcement with chronic intake of addictive drugs can lead to compulsory behaviour of drug use. Sometimes consumption of high dose to gain more pleasure reward can lead to acute toxicity. Drug abuse can lead to negative consequences in terms of economic burden, morbidities and even mortality.

Drug addiction has become a global problem which needs to be addressed with mass awareness and utilization of psychological as well as pharmacological therapies. In this article, we will review various current trends of drug addiction and strategies which are developed to tackle problem of drug addiction.

## Keywords:

Drug addiction, Reinforcement, Psychological therapy, psychostimulants

## Introduction

Addiction is manifested by a high motivation to use a drug in spite of negative outcomes.<sup>[1,2]</sup> Though every addictive drug had its own specific acute effects, but intake of all drugs leads to the strong feelings of reward and euphoria. Addictive drugs use can cause adaptive changes such as tolerance (i.e, high dose required to sustain same effect) and withdrawal symptoms become apparent when the abused drug is terminated abruptly.<sup>[1,2]</sup>

## Trends of drug use

As per World drug report 2019, drug use was reported in approximately

more than one fourth of the world population in age group of 15–64 years and an estimated 35 million people were diagnosed with substance use disorder. Treatment gap is also reported with only 1 out of 7 people in need of drug dependence treatment having access to treatment programme. As per the report, the most commonly used drug worldwide is cannabis (188 million people). Approximately 53.4 million had opioid use worldwide and more than half of this population was from Asia. There is an increase in number of people who had substance use as compared to previous years which may be because of the better consideration of the extent of substance use from surveys done in India as well as Nigeria.<sup>[3]</sup>

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Recent national survey conducted by Ministry of Social Justice and Empowerment, (MoSJE) and AIIMS New Delhi based National Drug Dependence Treatment Centre (NDDTC) in India showed that most commonly used addictive substance in India is alcohol [16 crore individuals (14.6% of population between 10 and 75 years of age)] followed by cannabis [3.1 crore individuals (2.8% of population)] and opioids [2.26 crore individuals (2.1% of population)]. Prevalence of opioid use is approximately three times as compared to opioid use at global level.<sup>[4]</sup>

### **Dopamine Hypothesis for Drug addiction**

Positive reinforcement is the main factor in the development of adaptive changes that underlies addiction. Mesolimbic reward pathway involves dopaminergic neurons that extend from ventral tegmental area in midbrain to the ventral striatum in forebrain. Release of dopamine from these neurons mediate reward of pleasant stimulus. Changes in dopamine function can lead to compulsive-type behaviours.<sup>[1,5]</sup>

Since almost all addictive drugs enhances dopamine levels, these drugs are classified on the basis of their molecular targets and the underlying mechanisms.

- i. Drugs acting through Gi protein-coupled receptors: opioids, cannabinoids, f-hydroxybutyric acid (GHB), and hallucinogens.
- ii. Drugs acting through ionotropic receptors: nicotine, alcohol, the benzodiazepines, dissociative anaesthetics, and some inhalants
- iii. Drugs that bind to monoamine transporters: cocaine, amphetamines, and ecstasy.

### **Initiatives by Indian government to tackle drug addiction**

Three broad approaches are followed to tackle the problem of drug use – “supply reduction,” “demand reduction,” and “harm reduction.”<sup>[4,6]</sup>

The “supply reduction” aimed at implementing the relevant drug laws to decrease the availability of addictive drugs and is managed by many agencies in the central or state governments. Indian government framed National policy on Narcotic drugs and Psychotropic substance to tackle drug menace in the efficient way.<sup>[4,6]</sup>

The “demand reduction” sector aimed at reducing the demand for drugs through three most important interventions: prevention, treatment, and rehabilitation. The MoSJE and Ministry of health & family welfare (MoHFW) are actively involved in providing treatment services by implementation of many schemes/policies/programmes. MoSJE implemented National Action Plan (2018-2025) for Drug Demand Reduction (NAPDDR) and Central sector scheme of assistance for prevention of alcoholism and substance abuse.<sup>[7,8]</sup> NAPDDR focuses on training of associated health workers and availability of Integrated Rehabilitation Centre for Addicts (IRCA) for rehabilitation of drug-dependent persons.<sup>[7,8]</sup>

Drug de-addiction programme is coordinated by MoHFW which focuses on establishment of drug de-addiction centres (DACs). National Drug Dependence Treatment Centre (AIIMS New Delhi) launched scheme “Strengthening DDAP: Establishment of Drug Treatment Clinics” which proposed that drug treatment clinic should be open in government healthcare setup.<sup>[6]</sup>

“Harm reduction” aimed at prevention of infections such as human immunodeficiency viral

infection and viral hepatitis (B&C) among people with injectable drug abuse (PWID), even when complete abstinence is impossible. Such strategies are endorsed by MoHFW or National AIDS Control Organization. For example a specific intervention: Opioid Substitution Treatment is provided to PWID under National AIDS Control Programme (NACO).<sup>[6]</sup>

### Management of drug addiction

Addictive drugs can be CNS depressants (Alcohol, sedatives/hypnotics) or CNS stimulants (Cocaine, amphetamines, Cannabinoids, psychedelic agents). Strategy for management of drug addiction incorporates many components such as pharmacotherapy, behavioural therapy and social

support. Management must include physical, mental, social and vocational rehabilitation.<sup>[9]</sup>

### Pharmacological interventions in drug addiction

Pharmacological treatment is of utmost importance at various levels of the disease progression. Detoxification is main step in the process of treatment. Pharmacologic interventions aim to alleviate the withdrawal syndrome. FDA approved antagonists are available in case of overdose of addictive drug. Substitution therapy by replacement of abused drug by an agonist that acts through same receptor is also another option for the treatment for drug use. Following table depicts the pharmacological therapies for various substance use disorders:<sup>[1,9,10,11,12]</sup>

	Drugs to alleviate withdrawal symptoms	Drugs to block effect of addictive drug/ to treat toxicity/ to prevent relapse
Alcohol use	Benzodiazepines (oxazepam at dose of 15-30 mg every 6-8 hrs)	<ul style="list-style-type: none"> <li>• Naltrexone (Opioid antagonist blocks endorphin activation)<sup>[13]</sup></li> <li>• Acamprosate (competitive inhibitor of the NMDA receptor which normalize the alcohol induced imbalance in neurotransmission)<sup>[14]</sup></li> </ul>
Opioids	<ul style="list-style-type: none"> <li>• Oral clonidine and alpha<sub>2</sub> adrenergic agonist<sup>[10,15]</sup></li> <li>• Lofexidine is FDA approved for suppression of opioid withdrawal symptoms.<sup>[16]</sup></li> </ul>	Naltrexone (FDA approved drug for prevention of relapse). <sup>[13]</sup> Naloxone to treat acute toxicity
Benzodiazepines	<ul style="list-style-type: none"> <li>• Benzodiazepines with long half-life (diazepam, chlorazepate)<sup>[1,10]</sup></li> <li>• Anticonvulsants (Carbamazepine and phenobarbital)</li> </ul>	Flumazenil (antagonist)

Nicotine	<ul style="list-style-type: none"> <li>• Nicotine replacement therapy.<sup>[17]</sup></li> <li>• Bupropion<sup>[18]</sup></li> </ul>	Varenicline <sup>[19]</sup> (high affinity partial agonist for nicotinic acetyl-choline receptor, reduces cigarette craving)
Cannabis <sup>[20]</sup>	<p>No drug approved till date.</p> <p>Following drugs show some benefit in clinical trials:</p> <ol style="list-style-type: none"> <li>a) combination of THC and Nabiximols as oromucosal spray.<sup>[21]</sup></li> <li>b) N Acetyl cysteine<sup>[22]</sup></li> <li>c) Gabapentin<sup>[23]</sup></li> </ol>	Although antagonism of CB1 receptors is beneficial in acute cannabis intoxication but such drugs were withdrawn from the market because of psychiatric adverse effects such as suicidality and anxiety. <sup>[24,25]</sup>
Methamphetamines <sup>[26]</sup>	<p>No drugs approved till date</p> <p>Drugs evaluated in clinical trial:</p> <ol style="list-style-type: none"> <li>a) D-Amphetamine (Results showed that it decreases use among males who had a lower baseline level of methamphetamine use)<sup>[27,28]</sup></li> <li>b) Mirtazapine (found efficacious)<sup>[29]</sup></li> <li>c) Bupropion (useful for less severe SUD)<sup>[30]</sup></li> </ol>	Study showed beneficial effect of naltrexone in methamphetamine use disorder <sup>[31,32]</sup>
Cocaine <sup>[33,34]</sup>	<p>No FDA approved drugs</p> <p>Positive results with modafinil, long-acting amphetamine &amp; methamphetamine<sup>[35,36]</sup></p>	TA-CD vaccine (combination of nor-cocaine with inactive cholera toxin) <sup>[37]</sup> found to reduce relapse

Several other treatment options are also available for treatment of drug use disorder, for instance Disulfiram is FDA approved drug used as aversive therapy for treatment of alcohol dependence by inhibition of alcohol dehydrogenase inhibitor. Substitution therapy is another intervention in opiate dependent individuals in which addictive drug is replaced by methadone, a long acting opioid or naloxone/buprenorphine combination to prevent withdrawal symptoms. Use of methadone as

alone maintenance therapy can lead to various issues such withdrawal symptoms in case of missed dose and fear of drug abuse.<sup>[38]</sup> FDA approved naloxone/buprenorphine combination (available as tablet and film) for maintenance therapy of opioid dependence.<sup>[39,40]</sup> As substitution therapy, buprenorphine is a long acting, high affinity partial agonist at mu receptors which prevents withdrawal symptoms. Buprenorphine prevents the abuse of other

opioids by blocking their binding to opioid receptors whereas naloxone co-administration will reduce opioid agonist adverse effects with buprenorphine and also prevents the abuse with buprenorphine.<sup>[38,39,40,41]</sup>

### **Other interventions for treatment of drug addiction**

**Cognitive behavioural therapy:** This approach focuses on teaching skills to drug abusers and helps them in elimination of maladaptive behaviour and dysfunctional thoughts. Cognitive interventions deal with encouraging the patient to cease drug abuse by exploring pros as well as cons of drug use and recognizing wrong decisions that could lead to hazardous circumstances. Behavioral strategies are developed for coping with craving and relapse in relation to drug use. Cognitive behavioral therapy can be face to face or computer assisted CBT.<sup>[42,43,44]</sup>

**Motivational interviewing:** This is method for enhancing intrinsic motivation to change drug use behaviour. The therapist intervenes by empathetic approach and uses conversational approach to resolve any ambivalence which the patients might have. This method incorporates four principles: empathy by counsellor, self-efficacy (onus on client to choose and carry out any activities to change), rolling with resistance (no confronting of patients resistance by counsellor), develop discrepancy (counsellor should help in making patient aware about discrepancies between current situation and future goals).<sup>[42,45]</sup>

**Contingency management:** This approach is used to augment another psychosocial or pharmacological intervention by employing incentives to encourage therapy attendance and/or abstinence from drug use.<sup>[42,46]</sup>

**Physical therapy treatment:** This approach is to correct muscle deconditioning by continued drug addiction. This helps patient in leading a healthy lifestyle. For instance, gait and balance training, range of motion exercises and building of weakened muscles can be beneficial in patients with alcoholic neuropathy. Co-ordination exercises are also important to treat impaired level of co-ordination in substance abuse. Pain of drug abuse can be treated with the application of hot or cold packs or physiotherapy intervention.<sup>[9,47]</sup>

**Occupational therapy:** It is an important component of process of rehabilitation. It aids individual in identification and matching personal skills and work habits to the workplace.<sup>[9,47]</sup>

**Family therapies:** Goal of family therapy is to obtain information regarding factors which can contribute to drug use for example, information about degree of abstinence, compliance to deaddiction therapy and contact with drug-using peers. Engagement and retention can be increased by involvement of family members in deaddiction therapy.<sup>[9,47]</sup>

### **Conclusion**

Recent surveys and reports suggests that majority of people are suffering from drug addiction and substance use disorders. Creation of supportive treatment and elimination of various triggers can prove beneficial in deaddiction therapy. Pharmacological interventions can be useful to control withdrawal symptoms, to prevent relapse and to treat toxicity. To date no single drug therapy eliminates addiction efficiently. There is need to

combine psychological interventions along with drug therapy in treating drug addiction for better

outcome.

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