

# Drug Induced Psychosis and Criminal Behaviour among Young Offenders

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## Abstract

Drug abuse has always been a complex phenomenon since its inception or usage started across the world. Initially it was termed as immigrant problem, after a while it was regarded as criminal issue which is existing till today but now for the last one decade it has been assumed as more social and public health problem which need immediate attention from relevant stakeholders to tackle and combat this mounting drug abuse epidemic. A drug addict start feeling the sense of well-being through regular intake of these drugs but once that addict tries to get rid of this habit or do not have access to his choice of drugs due to financial or other reasons, the body starts reacting in a certain way, which is known as withdrawal symptoms. The test of true addiction is the withdrawal/abstinence syndrome, i.e., the characteristic symptoms of severe physical and mental distress following withdrawal. To make matters worse, many drugs affect the portion of the brain responsible for cognition and restraining compulsions. This impairs the addict's ability to recognize that his actions are self-destructive. Even when he does come to this realization, his ability to resist the impulse to use drugs is drastically reduced. A study conducted in this regard indicated that different age group are addicted to different type of drugs, young generation are mostly found to be addicted to heroin or cocaine abuse and aged generation are found to be more inclined towards marihuana or cannabis. The literature provides ample evidence of the relationship of substance abuse to crime. Research over the last 20 years has established a strong correlation between substance abuse and juvenile delinquency. Having regard to the level of drug abuse scenario in India, it can be safely said that there is sound relation between drug abuse, mental illness and criminal behaviour. Government of India has been following International footprints relating anti-drug legislation and firmly supports retributive/ punitive theory of punishment to control the rising drug abuse problems in India from the beginning. Even America which has initiated a "war on drugs" during early 1980's has realised that imposition of severe punishment is not the answer to the growing drug abuse problems in their country. Slowly their punishment oriented approach was turned into disease model approach.

**Keywords:** Drug Addiction, Young Offenders, Psychosis, Criminal Behaviour, Neurotransmitter.

## Introduction

The terms "drug abuse" or "drug misuse" has been defined as consumption of illicit narcotics substances such as marijuana, cannabis, Cocaine and heroin as well as misuse of such substances that are easily available for medical purposes or otherwise having psychoactive properties such as pain killers, cough syrups, medicine for depression or anxiety, solvents, over-the-counter drugs, or prescription drugs among adults as well as teenagers. Most often these substances are used for their psychoactive effects and without the supervision of a physician or other medical professional.<sup>1</sup> Drug abuse has always been a complex phenomenon since its inception or usage started across the world. Initially it was termed as immigrant problem, after a while it was regarded as criminal issue which is existing till today but now for the last one decade it has been assumed as more social and public health problem which need immediate attention from relevant stakeholders to tackle and combat this mounting drug abuse epidemic. The failure of the "war on drugs" around the world has prompted the governments to shift their focus on more humane treatment towards drug addicts as penal approach has grossly failed, especially since the emergent acknowledgment of the alliance of

infectious diseases such as HIV/AIDS with drug abuse during the last two decades. There are number of studies conducted on other health consequences of drug use/abuse that suggest increased negative health effects among drug users.<sup>2</sup> There are numerous health effects of drug usage that may differ from person to person as well as the type and amount of drug taken by the addicts. The number of health consequences consists of death due to overdose, suicide due to frustration, homicide due to mental and physical disorders or accidents caused under the influence of drugs. Besides that there are other repercussions of the prolonged drug abuse such as HIV infection, violent behaviour, pneumonia and hepatitis C. In US, it was reported that Drug abused caused approximately 17,000 deaths in 2000.<sup>3</sup> Drug abuse is frequently a significant determinant or associated with the sexual risk behaviours as well.<sup>4</sup> Drug use has time and again been established to have important component of growing violent, sexual and other risk behaviours in many varied populations especially young generation.<sup>5</sup>

#### **Review of Literature**

Due to recent scientific development, it has become easier to measure the impact of drug abuse upon drug abusers including women, children, youngsters and aged generation. A study conducted in this regard indicated that different age group are addicted to different type of drugs, young generation are mostly found to be addicted to heroin or cocaine abuse and aged generation are found to be more inclined towards marijuana or cannabis.<sup>6</sup> Another study has revealed that men more prone to drug abuse and drug dependence as compare to women.<sup>7</sup> As per other findings it has been discovered that high school graduates are more involved in drug abuse and the addiction goes upto College if they do not drop out of high school due to drug related complexities.<sup>8</sup> Another finding has recorded that drug abusers who smoke the narcotics substances have higher degree of possibility of having psychiatric or substance abuse disorder.<sup>9</sup> Those teenagers who started to abuse drugs at younger age demonstrated early propensity to criminal behaviour, poor psychological health and educational accomplishment, they are more association with degenerate or substance-using friend circle and more family dysfunction. They also found that the young generations are more inclined to drugs.<sup>10</sup> Another study indicated that there is a close connection between marijuana use and psychiatric illness.<sup>11</sup> They discovered that prior mental issues also leads to cannabis abuse and further cause behaviour disorder in kids and young people and with disruptive persona disorder in adults.<sup>12</sup> Another study researched upon the long term effects of cannabis on the central nervous system of the drug addict. Findings revealed

that long term cannabis use was associated with impairment of selective attention and cause severe damage to the central nervous system responsible for regular body functions. Another research indicated that drug abusers suffer from more mental disorders as compare to alcohol abusers.<sup>13</sup> Results also showed that people suffering from mental disorders are more inclined towards drug use for self-medication purposes as compare to neurotic and normal people.<sup>14,15</sup>

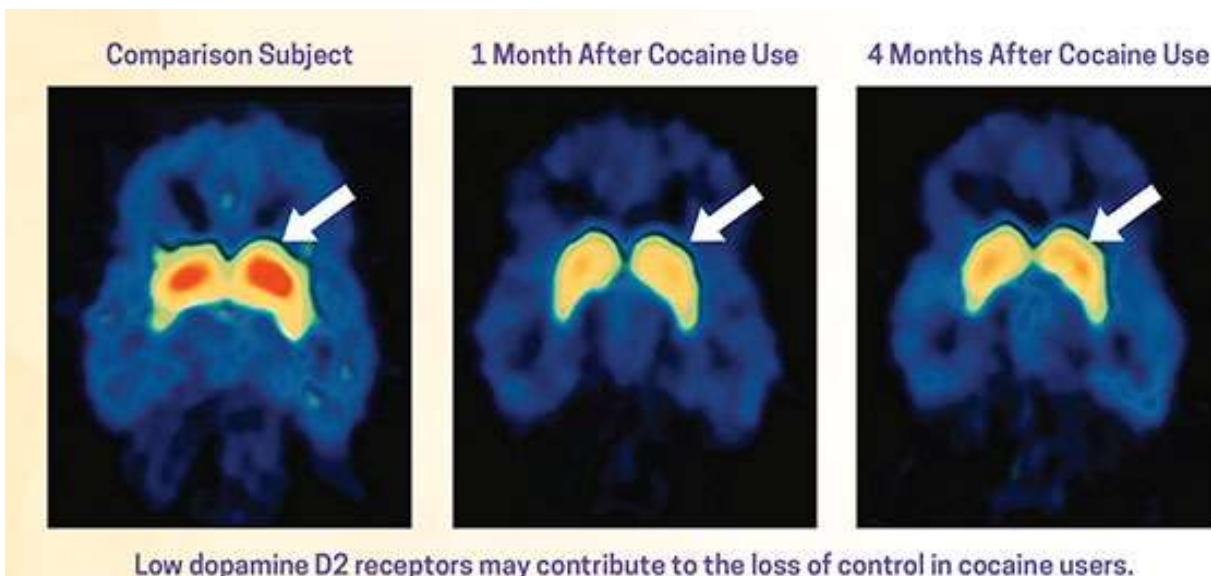
#### **Drug Induced Psychosis**

As per number of scientific researches, there are ample proof that prolonged usage of narcotics substances hamper with the way neurons transmit, collect, and process indicators via neurotransmitters. It has been analysed that some type of drugs especially heroin and marijuana has the capability to stimulate neurons for the reason that their chemical configuration imitate that of an ordinary neurotransmitter in the human body. This permits the narcotics to affix onto and set off the neurons. Even though these drugs impersonate the brain's personal chemical substances, they don't trigger neurons in the similar way as an innate neurotransmitter, and they show the way to anomalous messages being transmitted through the system.

Besides the psychological effects of marijuana and heroin there are some other drugs, such as cocaine, amphetamine or other synthetic substances that has the ability to cause the neurons to discharge oddly huge amount of ordinary neurotransmitters or avert the usual reprocess these mind chemicals by meddling with transporters. This too intensifies or upset the usual communication amid neurons.<sup>16</sup> Since opioids are the most used drugs in the world, this drug also has some grave negative effects on the mental health of drug addicts. It affects the brain stem<sup>17</sup>, which have power over crucial utility vital to existence, such as heart rate, respiration, and sleeping which explains the reason why overdoses can cause dejected breathing and demise.<sup>18</sup>

For the brain, the distinction amid ordinary rewards and narcotics use rewards can be equated with the distinction amid someone murmuring into ear and somebody screaming into a microphone. Just as we decline the level of audio on a device that is excessively deafening, the brain of somebody who abuses drugs fine-tune by generating smaller amount of neurotransmitters in the reward circuit, or by dropping the amount of receptors that can obtain indicators. As a consequence, the individual's capability to feel gratification from naturally gratifying activities is also abridged.

Following is the image of MRI of the human brain which provides clear insight into the effects of prolonged usage of drug abuse especially Cocaine<sup>19</sup> addiction.



Source: National Institute on Drug Abuse.NIDA. "Drugs, Brains, and Behavior: The Science of Addiction." National Institute on Drug Abuse, 20 Jul. 2018, <https://www.drugabuse.gov/publications/drugs-brains-behavior-science-addiction>

Drugs can modify significant brain part that are essential for life-sustaining task and can coerce the obsessive drug make use of that results dependence.

The *basal ganglia*<sup>20</sup> is a very vital component which play an important role in various human activities such as enthusiasm, including the enjoyable outcomes of beneficial physical activities like food intake, entertainment, and in configuration of daily patterns of work and routines. These areas form a vital joint of what is at times described as the brain's "reward circuit." Drugs over-activate this circuit, generating the ecstasy of the drug elevated, but with recurring experience, the circuit become accustomed to the existence of the drug, deteriorating its sensitivity and it became tough to experience gratification from anything besides the narcotics substances.

The extensive element called *amygdala*<sup>21</sup> has a most important work such as sensitivities like concern, bad temper, and awkwardness, which exemplify extraction after the drug effects weaken and as a result encourage the individual to ask for the drug yet again. This course develops into more and more susceptible with amplified drug use. Over time, an individual with substance use chaos uses drugs to get momentary aid from this anxiety rather than to get elevated.

The *prefrontal cortex*<sup>22</sup> controls the capacity to sense, prepare, unravel problems, make resolutions and put forth restraint over cravings. This is also the final component of the brain to fully grown, that is why the youngsters are generally susceptible to drug related problems. Changing equilibrium amid this route and the remuneration and strain courses of the basal ganglia and extensive amygdala cause a mental compulsion to look for more drugs with reduced urge control. As per the reports published by the United

Nations Office on drugs and crime there are approximately 275 million people worldwide, which is roughly 5.6 per cent of the global population aged 15–64 years, used drugs at least once during 2016.<sup>23</sup> Out of the above mentioned data almost 31 million people who use drugs have developed a drug use related physical and mental disorders, which means that they are in immediate need of medical treatment to get rid of this evil before it is too late. As per above stated report almost 76 percent of deaths among drug addicts are due to overdose opioids of these drugs as due to regular intake of drugs, physical and psychological dependency on drugs force the drug addicts to intake more amount of drugs every time to feel the same the sense of euphoria.

**Meaning of Mental Health**

As per the International Organisation WHO that is responsible for the upholding the basic human rights principle in deference to the Maintenance of overall well-being of the human beings defined the term 'mental health' as "a state of well-being in which every individual realises his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community."<sup>24</sup>

American Psychiatric Association that provide definition of mental illness in DSM-5 as "a syndrome characterized by clinically significant disturbance in an individual's cognition, emotion regulation, or behaviour that reflects a dysfunction in the psychological, biological, or developmental processes underlying mental functioning."<sup>25</sup>

Drug use can have considerable and destructive short-term and long-term consequence. Taking some drugs can be predominantly hazardous, in particular if you take elevated doses or coalesce them with other substances or alcohol. Here are some examples.

**Various Mental/Physical Disorders Associated With Drug Abuse**

Sr. No.	Name of the drug	Effects
1	Cannabis	Agitation, bloodshot eyes, challenges in problem solving, and paranoia, mood and anxiety disorders, personality disorders <sup>26</sup> depression and anxiety, cannabis dependency, psychiatric disorders.
2	Cocaine	Increased body temperature, irregular or rapid heart rate, high blood pressure, increased risk of heart attacks, strokes and even sudden death from cardiac arrest. transient, manic-like condition similar to amphetamine psychosis and schizophrenia, aggression, severe paranoia, restlessness, confusion <sup>27</sup> tactile hallucinations depression, exhaustion, anxiety, itching, mood swings, irritability, fatigue, insomnia, an intense craving for more cocaine, and in some cases nausea and vomiting, cocaine dependence, long-term health consequences, including psychotic behaviour, seizures or death due to overdose. <sup>28</sup>
3	Opioid	Significant impairment or distress, Addiction and dependence, medical complications from drug use including HIV/AIDS, hospitalizations, abscesses Opioid cravings, psychological dependence <sup>29</sup> . Opioid withdrawal symptoms may include nausea, muscle aches, diarrhoea, trouble sleeping, or a low mood <sup>30</sup> , long-term health consequences, including psychotic behaviour, seizures or death due to overdose. <sup>31</sup>
4	Ecstasy or molly (MDMA)	Dehydration, electrolyte imbalance and complications that can include seizures, damage the brain <sup>32</sup> , Persistent memory impairments, Psychological dysfunction, Imbalance of hormone production, Serotonin malfunction, Sleep problems, White matter damage in the brain, damage to axons, which impacts impulse conduction, decreased connectivity between brain areas.
5	GHB and flunitrazepam	Sedation, confusion and memory loss, impair the ability to resist unwanted contact and recollection of the event, at high doses, they can cause seizures, coma and death. The danger increases when these drugs are taken with alcohol. <sup>33</sup>
6	Hallucinogens, such as DMT, LSD, psilocybin	Hallucinations, Synesthesia, or mixing of senses, intensified perceptions, significant anxiety or depression, increased heart rate, <sup>34</sup> heart palpitations, dilated pupils, blurred vision, excessive sweating, tremors, paranoia, impaired judgment, impaired motor control.
7	Barbiturates, such as phenobarbital	depress the central nervous system and induce sleep or reduce anxiety, mood swings, disinhibited behaviors, <sup>35</sup> which can result in poor decision-making, Assaults or fights, <sup>36</sup> poor judgement, cognitive dysfunction, confusion, drowsiness, sedation, slurred speech, trouble with coordination, unsteady gait, uncontrolled eye movements, stupor, coma, blackouts or episodes of amnesia, Further, barbiturate abuse increases the risk of suicidal ideation or attempts. <sup>37</sup>
8	Inhalants such as cleaning fluids, spray paint, glue, and markers.	Euphoria, apathy, lethargy, poor judgment, dizziness, nausea or vomiting, hallucinations, delusions, <sup>38</sup> blurred vision, slurred speech, impaired coordination, muscle weakness, slowed or delayed reflexes, slow movement and thought, tremors, Stupor, coma, paranoia, mood and visual disturbances, and disorganized thought, 6 Hallucinogen Persisting Perception Disorder (HPPD): Characterized by the re-experiencing of symptoms experienced while under the influence of a hallucinogen (i.e., "flashbacks"). These symptoms could include hallucinations, intensified colors, and other visual disturbances, Persistent psychosis.

Drug addiction results in physical dependence which means "an altered physiological state brought about by repeated ingestion or administration of a drug in order to prevent the appearance of a characteristic illness called an abstinence syndrome which is the result of withdrawal of the drug, and are referred to as withdrawal illness or withdrawal symptoms."<sup>39</sup> Addiction has been described as "a state of periodic intoxication detrimental to the individual and to society, produced

by the repeated administration of the drug which signify the craving to, keep on taking the drug and to increase the dose with 'the development of psychic and sometimes physical dependence on the drug's effects which eventually becomes the sole motive of the drug addict to maintain the supply of drugs either by hook or crook.<sup>40, 41</sup>

A drug addict start feeling the sense of well-being through regular intake of these drugs but once that addict tries to get rid of this habit or do not have

access to his choice of drugs due to financial or other reasons, the body starts reacting in a certain way, which is known as withdrawal symptoms. The withdrawal symptoms of these stimulants are predominantly psychological in nature, i.e., signs of restlessness, nervousness, and even anxiety, primarily because of his inability to recapture the sense of well-being which he associates with the drug. The test of true addiction is the withdrawal/abstinence syndrome, i.e., the characteristic symptoms of severe physical and mental distress following withdrawal. These withdrawal/abstinence symptoms pressurize the addict physically and mentally and cause the overpowering or compulsive need for narcotics which become the primary causes of involvement of drug addicts in criminal activity.<sup>42</sup>

#### **Relation between Drug abuse and Mental illness**

Drug addicts who pursue the consumption of drugs at the expense of their health, finances, and the wellbeing of loved ones are often difficult to empathize with. For a judge or jury to get inside the mind of a drug addict requires understanding this mysterious and self-destructive compulsion that has no analogue for non addicts. Fortunately, neuroscience research has not only provided deep insights into how drug addiction is developed but is approaching the point of describing how it is experienced. While each drug is different in its effects, the addictive components are regulated by a common brain mechanism: the dopamine pathway.<sup>43</sup> This pathway is the body's natural mechanism for reinforcing positive behaviour and is necessary to survival and reproduction.<sup>44</sup> The feeling of joy that one gets from eating a new and delicious food while hungry, hearing a moving piece of music, laughing at a particularly funny joke, drinking a refreshing glass of water, reaching orgasm, or falling in love is partly caused by the release of the chemical dopamine.<sup>45</sup> The body regulates this pathway carefully, releasing enough dopamine to give the feeling of euphoria in small doses—just enough to develop memories that will encourage the individual to seek out these experiences in the future.<sup>46</sup>

Now imagine the most intense euphoria generated by these aforementioned experiences multiplied five to tenfold.<sup>47</sup> This is the feeling that some first-time drug users experience when their brains are flooded with dopamine.<sup>48</sup> The chemicals in the drug work to override the human brain's carefully wired system of rewards to give an overwhelmingly positive feeling.<sup>49</sup> This feeling lasts longer and is of much greater intensity than any positive reinforcement created by the natural release of dopamine.<sup>50</sup> Overriding the brain's natural reward system results in serious damage that dulls the user's ability to experience joy from natural positive reinforcement,<sup>51</sup> and over time the user requires more and more of the drug to experience the same pleasurable effects.<sup>52</sup> The drug addicts neurological reward system becomes drastically reordered. While no addicts are motivated by the natural dopamine release that has primed us to survive and reproduce, the drug addicts brain places these goals far below the goal of obtaining more drugs. Each use of the drug teaches the brain that the drug is a source (and eventually the

only source) of happiness, and a powerful craving begins to develop.<sup>53</sup> This craving is the result of a memory of the positive feelings that the drug created and was able to imprint on the brain, and it lasts for years after the user has stopped using drugs.<sup>54</sup> Continued drug use has severe side effects. Many drugs have a parallel negative reinforcement mechanism, which causes discomfort and even pain when the user abstains.<sup>55</sup> As users progress in the spiral downward toward addiction, they experience less of the positive feeling created by the drug and more of the negative feeling of not having enough. Eventually, the user must use drugs merely to escape the extreme discomfort of withdrawal.<sup>56</sup> To make matters worse, many drugs affect the portion of the brain responsible for cognition and restraining compulsions.<sup>57</sup> This impairs the addict's ability to recognize that his actions are self-destructive. Even when he does come to this realization, his ability to resist the impulse to use drugs is drastically reduced.<sup>58</sup>

#### **Drugs and Criminal Behaviour of Young Offenders**

The literature provides ample evidence of the relationship of substance abuse to crime. Research over the last 20 years has established a strong correlation between substance abuse and juvenile delinquency.<sup>59</sup> Currently, there are more than 350,000 juveniles on probation and in continuing care programs in the U.S. who have substance abuse histories (75-95%) but who rarely receive appropriate treatment.<sup>60</sup> Furthermore, 60% of the 1.7 Systematic methods to assess the course and incidence of treatment across juvenile systems are in the early stage. However, a 1997 survey of juvenile correction facilities suggested that only 36% offered some type of substance abuse intervention.<sup>61</sup> Substance abuse is one of the most common problems in the juvenile justice system, with prevalence estimates as high as 67 percent.<sup>62</sup> In fact, surveys of juvenile probation departments identified substance abuse intervention services as among the most critical expansion needs (National Council of Juvenile Justice, 1999). In 1999, there were 23,000 juveniles on probation in California. Crimes against persons were the major types of offenses, followed by property and drug crimes. Nearly 80% of these crimes were related to substance use by the offender and/or offenders were arrested for drug-related crimes. Recent survey results among youthful arrestees provide evidence of illegal drug use. For example, more than half of 211 juvenile male arrestees tested positive for at least one drug; marijuana was the most frequently detected drug.<sup>63</sup> A report<sup>64</sup> concluded that 60 to 87 percent of female offenders need substance abuse treatment. Among youthful arrestees, marijuana use increased from 25% in 1991 to 62% in 1999; it appears to have become the drug of choice among youth who get in trouble with law enforcement.<sup>65</sup> There are, of course, no easy answers to the complex problem of violence related to drug use and other related factors. However, a review of the literature (Howell & Decker, 1999)<sup>66</sup> suggests that the relationship between gangs, drugs and violence fall into three categories. First, pharmacological effects of the drug on the user can

induce violence. Second, the high cost of drug use often impels the user to support continued drug use with violent crimes (e.g., robbery, assault). Third, is the system violence; this refers to protection or expansion of drug territory. As per one study it is found that heroin-using high-rate offenders, intensity of offending appears to vary directly with intensity of drug use.<sup>67</sup> It was further examined that both drug use and onset of criminal tendency can occur in early puberty as products of similar external factors. The major factors responsible for the criminal behaviour and drug abuse includes physical abuse, criminal siblings, absence of traditional social controls, lack of parental attention or participation in rewarding school activities.<sup>68</sup> As per another study it was examined that more deviant environment, leads to more teenagers to perform poorly in school, to use multiple forms of illicit drugs frequently, and to participate frequently in predatory crime.<sup>69</sup>

Number of research has been carried out that emphasis that high frequency users are also very likely to be high-rate predators and to commit many different types of crimes, including violent crimes, and to use many different types of drugs. The relationship between high-frequency drug use and high-frequency criminality is intensified by long durations of involvement in drug use and predatory crime.<sup>70</sup> Adult offenders who commit robbery and burglary at the highest rates typically have been persistent offenders and drug users since they were juveniles, for example, using heroin as juveniles and starting to commit predatory crimes before they were sixteen years old.<sup>71</sup> The earlier the age of onset of cocaine or heroin use, the more likely persistent offenders are to be serious predatory offenders as adults.<sup>72</sup> There is a peculiar characteristics found in drug abusers who commit offences is that the frequent users of multiple drugs who commit predatory crimes at high rates and are frequently caught because they are opportunistic and do not plan their criminal activities to avoid recognition. Over one-third of this high-crime-rate, high-arrest-rate offenders reported onset of heroin use as juveniles and daily heroin use during the period before their last arrest<sup>73</sup> but they are not characteristic of all offenders who are arrested frequently. The onset of heroin addiction is often a key point in accelerating an existing criminal career. As they grow older, delinquents are likely to use more addictive drugs-starting with marijuana, progressing to hallucinogens, sedatives and analgesics, and then to cocaine and heroin.<sup>74</sup> As per another study it was found that burglary and robbery are the most common crimes that are followed by drug addiction among young offenders.<sup>75</sup>

#### **Suggestive Alternatives**

Individuals who develop addictions find it "almost impossible to stop the spiralling cycle of addiction on their own without treatment."<sup>76</sup> Fortunately, drug addiction is a treatable condition.<sup>77</sup> Not only treatment can benefit the individual, it also reduces the amount of crime committed by drug users.<sup>78</sup> With outside assistance, a drug addict can become a productive member of society<sup>79</sup> and avoid diseases associated with drug use, such as HIV.<sup>80</sup> To

be successful, drug treatment needs to be tailored to the particular needs of the individual.<sup>81</sup> The best treatment programs constantly monitor and assess the progress of individuals as they struggle with overcoming their addictions.<sup>82</sup> Because drug cravings can be triggered by stimuli associated with drug use long after the withdrawal effects are experienced, the best treatment programs involve long-term monitoring of patients as they experience repeated spikes in cravings triggered by their surroundings.<sup>83</sup>

Having regard to the level of drug abuse scenario in India, it can be safely said that there is sound relation between drug abuse, mental illness and criminal behaviour. Government of India has been following International footprints relating anti-drug legislation and firmly supports retributive/punitive theory of punishment to control the rising drug abuse problems in India from the beginning. Even America which has initiated a "war on drugs" during early 1980's has realised that imposition of severe punishment is not the answer to the growing drug abuse problems in their country. Slowly their punishment oriented approach was turned into disease model approach. The American government just like other western countries started to show more humane approach towards drug addicts as they are not criminal by choice but become one due to circumstances. Drugs courts, medical support, rehabilitative programmes and many other reformatory methods are being employed around the world replacing the old punitive methods that remained fruitless and grave failure.

In America, the **U.S Supreme Court** held in the case of **Robinson v. California**<sup>84</sup> that "**drug dependence is a disease and punishing someone for being ill constituted cruel and unusual punishment.**" While delivering the majority judgement Justice Stewart said "*narcotic addiction is an illness. ... To be sure, imprisonment for ninety days is not, in the abstract, a punishment which is either cruel or unusual. But the question cannot be considered in the abstract. Even one day in prison would be a cruel and unusual punishment for the "crime" of having a common cold.*"<sup>85</sup>

The decision is remarkable for its acknowledgment that drug reliance is a disease/infirmary and that punishment for ill health is a human rights infringement and relapsing into drug use is a component of the infirmity, by the logic of this decision, the suitable reaction is treatment, not punishment.

#### **Conclusion**

Narcotics addiction has gripped the young generation of today in every part of the world. The Young generation is involved in the farming or manufacture of drugs, or work as drug peddlers. As per the survey done by the UNODC has enlisted various factors naming; family unit, educational institutes, friends, socioeconomic and physical environment that are responsible for making the young generation more vulnerable to substance use. Most research suggests that early (12–14 years old) to late (15–17 years old) adolescence is a critical risk period for the initiation of substance use.<sup>86</sup> On the

other hand, facts shows that the huge majority of adolescent individuals do not utilize drugs and those who do utilize them have been exposed to diverse noteworthy issues associated to substance use. In most countries, cannabis is the most widely used drug, both among the general population and among young people. A global estimate, produced for the first time by UNODC, based on available data from 130 countries, suggests that, in 2016, 13.8 million young people (mostly students) aged 15–16 years, equivalent to 5.6 per cent of the population in that age range, used cannabis at least once in the previous 12 months. High prevalence of cannabis use was reported in North America (18 per cent) and in West and Central Europe (20 per cent), two sub regions in which past-year cannabis use among young people was higher than in the general population in 2016. Medical research shows that those who use cannabis before the age of 16 face the risk of acute harm and increased susceptibility to developing drug use disorders and mental health disorders, including personality disorders, anxiety and depression.<sup>87</sup>

Many other drug-related offenses, and particularly violent offenses such as assaults and murders, are connected with drug trafficking itself. To avoid arrest, drug dealers commit violent crimes against police, informants or witnesses.<sup>88</sup> Furthermore, other violent crimes are common among participants in drug trafficking, and because they want to avoid the police, much of this violence is not reported.<sup>89</sup> In many cases, interactional circumstances create a drug-crime relationship. Being involved in drug use and crime are sometimes common features of a deviant lifestyle. A wide range of psychological, social and economic incentives can combine to produce drug use and crime patterns that become firmly established in some persons. The likelihood and frequency of involvement in illegal activity is increased because drug users are exposed to situations that encourage crime, and the "crime" may be neither a drug-defined crime nor a drug-related crime.<sup>90</sup> As a result, crimes rise in number as offender drug use increases, because active drug users commit offenses at high rates.<sup>91</sup> Moreover, frequent use of multiple drugs generally follows involvement in property crime, and its onset may accelerate the development of a criminal career.<sup>92</sup> In sum, drug use and crime are not only related, but highly correlated.

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  19. The term addiction as used in this booklet is equivalent to a severe substance use disorder as defined by the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5, 2013)*.
  20. These MRI images compare the brain of an individual with a history of cocaine use disorder (middle and right) to the brain... These fMRI images compare the brain of an individual with a history of cocaine use disorder (middle and right) to the brain of an individual without a history of cocaine use (left). The person who has had a cocaine use disorder has lower levels of the D2 dopamine receptor (depicted in red) in the striatum one month (middle) and four months (right) after stopping cocaine use compared to the non-user. The level of dopamine receptors in the brain of the cocaine user are higher at the 4-month mark (right), but have not returned to the levels observed in the non-user (left).
  21. The basal ganglia (or basal nuclei) is a group of subcortical nuclei, of varied origin, in the brains of vertebrates, including humans, which are situated at the base of the forebrain. There are some differences in the basal ganglia of primates. Basal ganglia are strongly interconnected with the cerebral cortex, thalamus, and brainstem, as well as several other brain areas. The basal ganglia are associated with a variety of functions, including control of voluntary motor movements, procedural learning, habit learning, eye movements, cognition, and emotion. Stocco, Andrea; Lebiere, Christian; Anderson, John R. (2010). "Conditional Routing of Information to the Cortex: A Model of the Basal Ganglia's Role in Cognitive Coordination". *Psychological Review*. 117 (2): 541–74. doi:10.1037/a0019077. PMC 3064519. PMID 20438237. bWeyhenmeyer, James A.; Gallman, Eve. A. (2007). *Rapid Review of Neuroscience*. Mosby Elsevier. p. 102. ISBN 0-323-02261-8.
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  50. Roy A. Wise, *The Neurobiology of Craving: Implications for the Understanding and Treatment ofAddiction*, 97 *J. Abnormal Psychol.* 118 (1988) (analyzing the biological bases of drug cravings to explain why addictions are so difficult to break). at 120-21 (describing how drugs increase dopamine levels in the brain)
  51. See *id.* While all drugs of abuse affect the dopamine pathway, the degree of this effect varies depending on the drug. See Cami&Farr, at 980-81 (reviewing the mechanisms of opioids, cannabinoids, ethanol, cocaine and amphetamines, and other substances)
  52. "If drugs of abuse activate positive reinforcement mechanisms directly and centrally, they may do so with much greater intensity than can ever be summoned by environmental stimuli like food, water, or the reinforcing beauty of nature, art, or music." Wise, *supra* note 11, at 127; see also Terry E. Robinson & Kent C. Berridge, *Incentive-*

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