



Review Article

Impacts of Drug Addiction on Psychological and Emotional Health and Role of Medicinal Plants in Treatment of Drug Addiction

Samiya Rehman*, Eman Mustafa, Ali Ahmad Faiz, Maheen Kanwal, Farkhanda Yasmin and Arooj Fatima

Department of Biochemistry, University of Okara, Renala Khurd, Pakistan.

Abstract | Drug addiction in other words is an emotional, psychological and physical dependence on drugs which has become a serious issue in the world. Millions of people are using drugs due to different psychological, socio-cultural and family factors. In this regard geographical location and neurobiological circuits also acts supportive factors of addiction. As the rate of drugs usage has increased from era of industrialization, so now it is prevalent everywhere in rural and urban areas also in educational institutions of different countries of the world. Drug addiction has impacts on health and caused unbearable mental as well as emotional pain. Brain functioning is adversely affected by drug addiction, which causes reduction in cortex of brain, alteration in structure and function of myelin sheath, neuroinflammation resulted in reduced memory, decision making and thinking power. The adverse effects of drug addiction can be reversed to greater extent through usage of anti-inflammatory drugs, exercise and deactivation of microglial pathways. Plants are proved to be promising source of recovering drug addiction side effects. This article also focuses on psychological and emotional regulations, caused by drug addiction involve depression, schizophrenia, family problems and involvement in various criminal activities. Support of local community, use of preventive measures and public policies are required for strong long-term planning to prevent from drug addiction.

Received | October 30, 2022; **Accepted** | December 22, 2022; **Published** | December 28, 2022

***Correspondence** | Samiya Rehman, Department of Biochemistry, University of Okara, Renala Khurd, Pakistan; **Email:** samiyarehman@gmail.com

Citation | Rehman, S., E. Mustafa, A.A. Faiz, M. Kanwal, F. Yasmin and A. Fatima. 2022. Impacts of drug addiction on psychological and emotional health and role of medicinal plants in treatment of drug addiction. *Journal of Innovative Sciences*, 8(2): 311-325.

DOI | <https://dx.doi.org/10.17582/journal.jis/2022/8.2.311.325>

Keywords | Drugs, Depression, Emotional pain, Cannabis, Addictive behavior, Neuropsychological system



Copyright: 2022 by the authors. Licensee ResearchersLinks Ltd, England, UK.

This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Any substance that potentially changes biological function through its synthetic activity is referred to be a drug (Ekedegwa, 2016). One of the socio-psychological problems facing the modern world is addiction (Flora and Stalikas, 2012). Drug addiction is a continuous long lasting and deteriorating situation

in both men and 8 women (McHugh *et al.*, 2018). Addiction is an ongoing condition in which a person repeatedly uses drugs, which causes consistent changes in his or her behavior, feelings, and thinking. As a result, the person loses control and harms themselves or other people (Crews *et al.*, 2011). Addiction to drugs implies to psychological dependence and physiological compulsion. The physical and mental

states are changed by frequent and continuous use of any drug or chemical substance without a medical prescription (Wani and Sankar, 2016). Drug addiction is the compulsive need to consume a substance, despite the possible negative social, psychological, and physical effects. In other words, a person may have a strong physical dependence on the substance in addition to psychological and emotional dependence. It might cause an uncomfortable physical reaction when an addict stop using drugs (Naqshbandi, 2012).

Humans have used drugs since the dawn of time, but at first, it was never seen as a social problem or a threat to society as a whole. Drug abuse became a major social issue throughout the period of industrialization and modernization since it affected so many individuals. Despite being aware of its severe effects, drug addiction is widespread throughout the world (Patoari, 2021).

The epidemic of drug trafficking and drug addiction seems to be evident everywhere in the world today. Millions of drug addicts have miserable lives in a world where they must choose between life and death (Wani and Sankar, 2016). Drug addiction affects men and women, as well as people of all socioeconomic classes, education levels and employment status (Patoari, 2021). Most often, a drug abuser starts using drugs before turning 18 years old (Naqshbandi, 2012). Just in 2016, ten thousand female students were dependent on yaba (Rezvi, 2019). Drug use disorders and dependence may be more common in men than in women overall. However, if they start using drugs or alcohol, women tend to consume more alcohol, marijuana, opioids, and cocaine than men do (Becker and Hu, 2008).

Drug misuse might involve eating, sniffing, inhaling, or injecting drugs into one's body. The substance may be used for legitimate or medical purposes whether it is legal or illicit (Ahammed and Srabon, 2019). Drugs can come from natural, synthetic, and biosynthetic sources. The natural sources of drugs include medicines of a plant, animal, microbial, marine, mineral, or geographical origin. The sources of plant drugs include the entire plant, plant components, secretion, and exudate. Whole plants like datura, ergot, and ephedra are involved (Alamgir, 2017). Three types of methods can be used to produce drugs: those that only use plant products, those that include a semi-synthetic method, in which natural

materials are partially altered by synthetic substances to produce the finished result, and those that produce consumable drugs exclusively using man-made chemicals. Opium collected from the field for personal use, narcotic or psychotropic substances produced solely in a laboratory or manufacturing facility and coca bush leaves are processed to form cocaine and opium are three examples of these three (Tullis *et al.*, 1991). Opium, cocaine, and cannabis were all derived by man from their respective sources: The hemp plant and the poppy plant. Initially, they were exclusively used to relieve physical and emotional discomfort as well as for medical and surgical purposes (Abdul and Farhana, 2011).

The drug temporarily relaxes the addict, and occasionally people use drugs to avoid loneliness, forget sadness, relieve frustration, and reduce worry about personal issues (Pathak and Pokharel, 2018). Many young men and women try to overcome their disappointment, stress, depression by shifting to different drugs. Parents' attitude towards drugs plays a vital role in initiating the adolescents to use drugs. Children's drug addiction is strongly correlated with that of their parents, and where parents smoke, their children are twice as likely to start smoking (Jiloha, 2009).

Nowadays, drug misuse may be found almost anywhere: in homes, on streets, in workplaces, parks, slums, markets, and even in educational facilities in both urban and rural locations. Virtually all segments of society are severely affected by this problem (Mohiuddin, 2019). It causes educational drop out, financial crisis, domestic violence and destroy family bondage, put the family at risk and lead the family to be isolated from the community (Ahammed and Srabon, 2019) and increase criminal activities in the society which ultimately become a major challenge for the country. Drug misuse has a wide range of negative impacts that affect individuals, groups of friends, families, and society. The drug addict's family experienced social isolation. Due to drug purchases, the drug addict consumes the majority of the family's income (Shazzad *et al.*, 2014). According to the observation of Hossain and Mamun (2006), the drug users engage in a variety of social infractions, such as stealing, hijacking, pickpocketing, etc., as well as induce in unethical and immoral acts to raise money to buy drugs (Ahammed and Srabon, 2019).

International agencies, particularly the United Nations (UN) and World Health Organization (WHO), are alarmed by the rise in drug addiction rates around the globe. Almost daily, news or information about drug abuse, drug trafficking, or arrested drug users, peddlers, and dealers may be found in the newspaper on both a national and international level (Patoari, 2021). The illicit drug trade has expanded significantly over the past 25 years, and it now generates revenues that are close to \$300 billion annually, surpassing the value of crude oil traded globally. According to a WHO research, drug use is becoming a bigger issue in both developed and developing nations. Large-scale epidemics of amphetamine abuse also exist in Japan and Sweden in addition to the United States (Naqshbandi, 2012).

1.1 Risk factors

Young people's drug use is a silent killer that not only harms the addict but also their families, communities, and nations. The period of juvenility is full of anxieties, worries, variations, and complexities due to quick revolutionary biological as well as emotional changes, and because their mental capabilities are immature enough, they are unable to make the proper decisions in life and commonly engaged in antisocial behavior, such as drug abuse, which finally paralyzed a nation's faculties because they lack the maturity to make the appropriate decisions in life (Patoari, 2021).

Many environmental factors had the greatest effect on the tendency for drug use, followed by family factors, personal factors and social factors (Singh and Gupta, 2017).

Many reasons can lead to illegal usage of drugs (Glantz and Hartel, 1999). These consist of feelings of euphoria, peer pressure, boredom, life-changing experiences and stresses, and taught behavior (Khan, 2020). The number of drug addicts in the world is rising daily as a result of numerous sociocultural, psychological, and familial variables. Complex social and peer group influences, frustration, despair, curiosity, subcultural and psychological environments (Patoari, 2021), easy and affordable access (Masood and Us-Sahar, 2014; Qasim, 2015; Zaman *et al.*, 2015) to narcotics, all contribute to young people abusing drugs that urge young people to take drugs. Family disorganization, parental neglect, parent-child conflict, spouse loss, turmoil, indiscipline, loneliness, lack of emotional support, rejection of

love, overprotection, unemployment, repeated failure, personality, maladjustment, and easy access to drugs are major risk factors for drug usage (Shazzad *et al.*, 2014). Some significant family factors of drug addiction include the presence of alcoholism, the quality of the family relationships, the sense of family happiness, and the family's hierarchical structure. Children rarely use drugs in warm, loving families (Soron *et al.*, 2017). On the person, family, and society, drug addiction has a direct negative impact. Both one's physical and emotional wellbeing are impacted (Patoari, 2021).

1.2 Neurobiological circuits

Each chemical has slightly distinct impacts on the brain, but all addictive drugs, including alcohol, opioids, and cocaine, cause a pleasurable surge of the neurotransmitter dopamine in a part of the brain called the basal ganglia; few chemicals known as neurotransmitters are used to communicate between nerve cells. This region oversees regulating rewards and our capacity to learn based on incentives.

The brain circuits cause changes in them as substance usage grows. They reduce their dopamine sensitivity, which decreases a substance's capacity to cause pleasure or the "high" that comes from taking it. This is known as tolerance, and it shows how the brain maintains equilibrium and adapts to a new normal the substance's frequent presence. But as a result, users frequently take more of the drug to get the same level of high they are accustomed to these same circuits regulate how much we enjoy common pleasures like food, sex, and social interaction, and when they are harmed by substance abuse, the rest of life may start to feel less and less enjoyable to the user even when they are not using the substance.

The basal ganglia, extended amygdala, and prefrontal cortex are three crucial networks that are directly involved in the emergence and maintenance of substance. The positive, rewarding and pleasant effects of drug usage are controlled by the basal ganglia. Stress, anxiety, and irritability that frequently follow substance withdrawal are mediated by the expanded amygdala and many executive functions are performed by pre frontal cortex (i.e., the capacity to distinguish between thoughts and actions, set priorities, organize work, and make decisions) (Substance, Mental Health Services, and Office of the Surgeon, 2016).

1.3 Geographical proximity

In terms of the manufacture, cultivation, trafficking, and promotion of drug misuse worldwide, geographic closeness has been extremely important (Naqshbandi, 2012). Bangladesh is geographically located in the middle of the Golden Triangle (Myanmar, Laos, and Thailand) and the Golden Crescent (Pakistan, Afghanistan, and Iran), and as a result, Bangladesh faces a significant risk of drug use. Sixty percent (60%) of the world's methamphetamine (yaba) is only produced in three countries named as Myanmar, Laos, and Thailand (Golden Triangle) (Ahad *et al.*, 2017) and Bangladesh is utilized as a transit country for them (Observer Research Foundation) and has grown into a significant market for drug traffickers. Bangladesh has thus become victims of illicit drug trafficking despite not being a country that produces drugs (Ahad *et al.*, 2017). International drug traffickers prioritize Bangladesh as a crucial crossing point for smuggling yaba into the markets of Northern America, Africa, and Europe (Islam *et al.*, 2013).

Drug types and countries of origin tend to influence traffic patterns. For instance, cocaine trafficking originates in the Andean region and moves north through Central America, Mexico, and the Caribbean region to final points in North America, Europe, and other locations. Southwest and Southeast Asia is the primary origins of most heroin trafficking, with final processing of consumables occurring nearby. The path of distribution may pass through numerous countries and regions, including Malaysia, Thailand, Hong Kong, and China (Tullis *et al.*, 1991).

1.4 Global trend and number

There has always been a global tendency toward drug addiction from the dawn of time, yet the prevalence of addiction may differ from country to country. Due to variations in sociocultural, psychological, and familial factors, the quantity and prevalence of drug addiction may vary from state to state (Patoari, 2021).

According to world drug report of UNODC (2019), nearly half of the estimated 27 million problem drug users use injection methods (PWID). In 2013, there were approximately 1.65 million injecting drug users who had HIV. In addition to 42 million new infections of HIV each year, the global epidemic of addiction and drug usage also results in 5 million deaths.

Worldwide, alcohol consumption was linked to

50% of deaths from liver cirrhosis, 30% of deaths from oral and pharyngeal cancers, 22% of deaths from interpersonal violence, 22% of deaths from suicide, 15% of deaths from traffic injuries, 12% of deaths from tuberculosis, and 12% of deaths from liver cancer (Mohiuddin, 2019). According to the WHO, there are 2 billion drinkers, 1.3 billion smokers, and 185 million users of illicit drugs globally (Li and Burmeister, 2009). Currently, low- and middle-income nations account for 80% of tobacco consumers (LMICs) (Akanbi *et al.*, 2019); moreover, it is anticipated that 80% of tobacco-related deaths to take place by 2030 in LMIC (Asare *et al.*, 2019). In 2017, India had 27% of the world's tuberculosis (TB) patients, with smoking and alcohol misuse being responsible for 20% of the disease globally (Thomas *et al.*, 2019). In Australia, where 30 percent of fatal car wrecks include drunk and drive incidents, about 6,000 individuals pass away each year from alcohol-related disorders (Mohiuddin, 2019). Indirectly or directly, substance addiction which includes smoking, drinking, and using illicit drugs causes 11.8 million fatalities worldwide each year. The Global Burden of Disease study estimates that this number is greater than cancer mortality and accounts for a fifth of all global deaths (Roth *et al.*, 2018).

According to the 2021 world drug report, which was currently released by UNODC, over 36 million people experienced drug use disorders globally in the past year (UNODC World Drug Report 2020, Pandemic effects ramp up drug risks, as youth underestimate cannabis dangers, 2021).

According to a United Nations Drug Control Program (UNDCP)-sponsored survey, the Kashmir division alone is home to 70000 drug users, including 4000 women (Naqshbandi, 2012).

In Bangladesh, 77.26% of all drug addicts are between the ages of 16 and 35, according to the 2018 Annual Drug Report. Drug addicts spend about TK 50,000 crore annually (Rabbi, 2019). Drug abusers comprise 7.5 million persons in the nation, with teens making approximately 80% of this population. 50 percent of these young people are involved in various criminal activities (Patoari, 2021). The percentage of women who are drug addicts is only 20.06 percent in Dhaka city (Shazzad *et al.*, 2014).

The East Mediterranean Region, which encompasses

Afghanistan, Bahrain, and Egypt, has the lowest prevalence of alcohol use disorder (7.5%) and the highest prevalence in Europe (Eashwar *et al.*, 2019). According to reports, 75% of high school students in the US, which has the greatest national economy in the world, have used illegal substances, drank alcohol, or smoked tobacco (Kehinde *et al.*, 2019), over a million people took heroin in 2016 (National Academies of Sciences and Medicine, 2019b) and in 2017, 70,000 people died from drug overdoses (National Academies of Sciences and Medicine, 2019a; Slavova *et al.*, 2019).

The main cause of Pakistan's worrisome rise in drug use is that those in positions of power, wealth, and authority provide them constant support. And yet another factor is that it is widely and inexpensively available in our country. Pakistan has started importing and exporting drugs (Sajid, 2020). In Pakistan, about 44 tons of heroin are consumed annually. The US has a ratio that is two to three times greater. Pakistan is regarded as a hub for heroin consumption and one of the main marketplaces for heroin smugglers and dealers (David-Browne, 2014).

Approximately 25 to 44 percent of Pakistani students use illegal drugs (Khattak *et al.*, 2012). In Pakistan, 97% of the population is Muslim, and the other 3%, predominantly Christians, can purchase illegal goods with a legal authorization. Non-Muslims are only permitted to purchase a monthly maximum of five or 100 beer bottles. But the text and spirit of these restrictions were not followed. Foreigners who are not Muslims may order alcohol from hotels with licenses and may even request a legal license (Carreiro, 2011). In Pakistan, 125,000 people inject drugs, and 500,000 people use heroin. In only four of Pakistan's largest cities, there are 40,000 street kids who take drugs. In Pakistan, there are 7.6 million drug addicts, of whom 78 percent are men and 22 percent are women. This number rises by 40,000 each year (Sajid, 2020).

Since the introduction of heroin and other related drugs, drug usage is increasingly becoming a global problem. While substance addiction can involve compounds other than drugs, such as gasoline, cleaning solutions, Glue, and other chemicals, the term drug is typically used to refer to medicine (Ahammed and Srabon, 2019). There is a widespread misunderstanding that illegal drugs like cocaine, marijuana, and heroin, as well as the smuggling of prescription medicines, are

the main causes of drug misuse. There are numerous drug types that can be abused. For instance, aspirin and chloroquine are two medicines that are frequently abused and have the potential to be lethal. Sometimes girls will use chloroquine to induce abortions. Some individuals are rumored to mix aspirin with alcohol to make a stronger beverage. Additionally, youngsters misuse things like glue, cleaning products, and other chemicals. In light of this, not all misused substances are drugs (Possi, 1996).

According to a Times of India report, substance abuse affects kids as early as nine. The discovery of Indian students abusing substances like shoe polish, whitener fluids, and nail polish as drugs is quite astounding. The despicable thing is that they also utilize the soiled water from their socks as a medication (Wani, 2016).

In Bangladesh, cannabis is the substance that is most readily available, followed by pentyl, alcohol, yaba, and heroine. Addicts from lower-income families tend to use cannabis, while those from higher-status families tend to prefer yaba (Soron *et al.*, 2017).

The majority of drug addicts obtain their drugs through stealing from their families and engaging in criminal activity (Ahad *et al.*, 2017). Cannabis is still grown in the inaccessible hills of the Chittagong Hill Tract region despite severe government restrictions, and it appears to be increasing (Rahaman, 2014).

Popular substances include cannabis (marijuana), yaba (methamphetamine 30%, caffeine 70%), and phensedyl (codine, pseudoephedrine, and chlorpheniramine) among those who are addicted to drugs in the country. People from lower socioeconomic levels typically use cannabis and other inexpensive drugs, whereas those from higher socioeconomic classes mostly use yaba and phensedyl (Adnan *et al.*, 2018).

In 2008, 1.1 million Indians aged 12 and older who had taken crack at least once in the year before the poll and 5.3 million who had consumed cocaine in any form (Volkow, 2010). More than 3 million people worldwide die each year from smoking-related causes, according to estimates from the WHO (Singh and Gupta, 2017) (Table 1).

1.5 Impacts on psychological health

The mental health, emotional health and stress patterns are negatively altered by addiction of drugs as

mentioned in Table 2. The condition of brain in which it gets used to a drug intake is called neuroadaptation (Becker *et al.*, 2016). Three stages of addiction at brain level are defined as toxification, withdrawal and preoccupation (Volkow *et al.*, 2022), furthermore it was declared that addiction to any drug is a disease of brain, which leads to weakening the power of decision making and self-control. These abnormalities in brain function leads to relapsing of drug addiction (Volkow *et al.*, 2016). The drug addiction leads to alteration of brain chemistry and functioning (Giarratano *et al.*, 2020). Drugs i.e., cannabis, opioids, cocaine, steroids adversely affect cognition, memorization, and behavioral disfunction in further life. Drug abuses causes mental retardation through different mechanism like it causes neurotoxicity, neuroinflammation, alteration in neuro-circuits, (Guerra and Pascual, 2019).

There are previous reports that ethanol intake caused the malfunctioning of prefrontal cortex of brain, which will lead to adverse effects on cognitive and behavior of addict (Montesinos *et al.*, 2015). Alcohol drinking results in disfunction of prefrontal area and mesolimbic region of brain which leads to anxiety and disfunction in cognitive behavior (Spear, 2016). There were previous reports of explaining adverse effects of ethanol addiction which causes the reduction in grey

matter (myelin) of brain. Reduction and structural alteration in grey matter (Myelin) caused lesser processing of brain, reduction of short term and long-term memory and thinking abilities (Montesinos *et al.*, 2015). Molecular mechanism involved in brain disfunction involve activation of TL4 responses which causes neuroinflammation, demyelination and brain damage through activation of transcription factors NFkB (An *et al.*, 2014) as summarized in Figure 1.

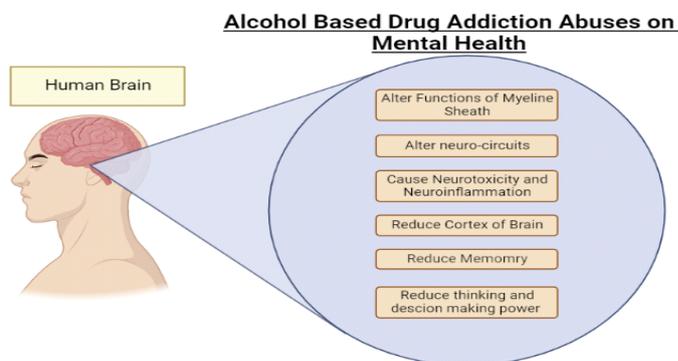


Figure 1: Effect of alcohol based drugs on mental health.

Effects of Drug addiction can be reversed by using anti-inflammatory compounds medicines (Vetreno *et al.*, 2018) or plant based natural anti-inflammatory products exercise (Vetreno *et al.*, 2018) stopping activation of TL4 (microglial) pathways.

Table 1: increase rate of drug abusers of different ages in US.

Addiction rate in countries	Age	Drug	Year	Reference
United States S\$21.9 billion	40 years	Heroin	2001	(Tamai <i>et al.</i> , 2001)
2.2 million United States	18-29 years	Marijuana	2003	Survery on durg use
20 million in US.	12 years above	Alcohol or other drugs	2013	(Lipari <i>et al.</i> , 2013)
200 million people	15 – 46 years	opiatase	2013	(Karrari <i>et al.</i> , 2015)
2.4 million people US	18 years or above	Opiods	2017	(Smasha, 2017)
2.6 million people US	12 years or above	MDMA (Ecstasy/Molly)	2017	nida.nih.gov 2017
2.2 million people US	18 years or above	Cocaine	2018	(Smasha, 2018)
23.6 million people US	12 years or above	tobacco	2020	2020 National survey on drug use
11 million people US	18 years or above	Nonprescription use of opiods	2019	(Kazmers <i>et al.</i> , 2019)

Table 2: Type of response of signaling in brain caused by mentioned specific type of drug.

Cannabis	Cannabinoid receptors signaling, Neuroimmune response, causing Shizoprenia	Chadwick <i>et al.</i> (2013), Kendall and Yudowski (2016), Zamberletti <i>et al.</i> (2015)
Opioids	Opioid receptors signaling, Neuroimmune response	Al-Hasani and Bruchas (2011), Hutchinson <i>et al.</i> (2012), Cahill and Taylor (2017)
Cocaine	VTA dopaminergic system, Neuroimmune response	Wong <i>et al.</i> (2013), Muriach <i>et al.</i> (2010), Northcutt <i>et al.</i> (2015)
Amphetamines	Free radicals/oxidative stress, Neuroimmune response, Ionotropic purinoceptor P2 × 7	Parrott <i>et al.</i> (2004), Frau <i>et al.</i> (2013), Fernandes <i>et al.</i> (2016)
Anabolic androgenic steroids	Neurotransmitter systems dysfunction, Immune response	Bertozzi <i>et al.</i> (2018), Marshall-Gradisnik <i>et al.</i> (2009), Riezzo <i>et al.</i> (2014)
Smoker (Nicotine abuser)	Schizophrenia,	(Weiser <i>et al.</i> , 2004)

The health, family, and society of drug users are all negatively impacted. It disrupts society and leads family members to experience excruciating mental suffering and indescribable emotional sorrow. Adolescents' physical, psychological, moral, and intellectual development is completely destroyed. It leads to educational failure, unemployment, economic hardship, psychiatric illnesses, marital discord, domestic abuse, criminal activity, and many other societal consequences (Siddike *et al.*, 2017).

Alcohol, ecstasy, heroin, and other psychoactive substances can all have an impact on our mood. Drugs alter the molecules in our brains, which affects the messages those chemicals are attempting to transmit (Abuse, 2018). While addicts use them and after they stop using them, all psychoactive substances have the potential to cause mental health issues (withdrawal). Anxiety, mood swings, sadness, difficulty sleeping, and psychosis are just a few of these issues. Depression, schizophrenia, bipolar illness, anxiety disorders, and attention-deficit hyperactivity disorder are among the psychological conditions that are linked to addiction (ADHD). Patients may experience bouts of extremely intense anxiety, an increase in heart rate, sweating, shortness of breath, and a feeling of losing control during their panic attacks (Gordon *et al.*, 2013). Addicts may have a sense of strangeness and unreality in their surroundings or a loss of self-awareness and reality. Delusions, which are beliefs that aren't true, and hallucinations, which include seeing or hearing things that aren't there, can both be brought on by psychoactive medications. They may experience manic episodes, which include high mood, delusions, impulsive conduct, racing thoughts, and are characterized by sadness, restlessness, irritability, exhaustion, and loss of pleasure. Drugs like cocaine, amphetamines, heroin, and methadone, as well as others, may be the cause of this mood disorder (Aljubori, 2020).

Lasser *et al.* (2000) has been found that 44% of smokers of cigarettes suffer from a mental illness or drug misuse problem. Hall and Solowij (2006) examined cannabis's long-term effects on the central neurological system. Results showed that chronic cannabis usage (daily or nearly daily use for at least ten years) was linked to a reduction in the ability to pay attention to details. Fergusson *et al.* (1996) evaluated the immediate effects of early cannabis consumption. They discovered that children who admitted to using

cannabis as a young child had early tendencies toward criminality, poor mental health, and low academic achievement. They include more ties to immoral or drug-using peers and more family problems. Warner *et al.* (1995) revealed that males abuse and become dependent on drugs more frequently than women; the sex ratio for drug abuse is more similar to that of alcoholism. Weller and Halikas (1985) supervised a study on cannabis consumption and psychiatric disorders. They found cannabis use to be co-morbid with both antisocial personality disorder in adults and conduct disorder in children and adolescents. Dube and Handa (1971) shown that compared to people who use other drugs, alcohol users have much lower rates of mental illness. Results indicated that psychotic people use drugs more frequently than neurotic and normal people (Doherty *et al.*, 2008).

Ecstasy is a feeling produced by drug that causes mild pleasure and hallucinations, and it has grown particularly popular in clubs and raves in many cities (in the Netherlands and, to a lesser extent, Belgium), as well as on college campuses (Singh and Gupta, 2017).

The nucleus accumbens may temporarily lose 20% of its dopamine receptors after chronic use of amphetamines (and cocaine), at least for four months after the last exposure (Volkow *et al.*, 2001).

1.6 Impacts on emotional health

Poor emotional regulation skills lead to a susceptibility to take drugs and eventually develop an addictive condition, which is a well-recognized feature of drug addiction (Chinet *et al.*, 1998). Khantzian (Killgore and Yurgelun-Todd, 2007) was the first to suggest that people turn to drugs as a way to lessen unpleasant emotional states and to augment beneficial consequences.

Drug dependence is linked to structural, cognitive, and emotional system abnormalities in the brain (Asensio *et al.*, 2010). By causing emotional processing to be biased toward drug-related stimuli rather than those connected to natural rewards, disturbances in these systems help to maintain addicted behavior by enhancing drug craving. Sensation-seeking is one of the emotional characteristics that puts people at risk for using drugs, and persistent drug use can worsen emotional dysregulation by impacting the reward, motivation, and stress systems (Murphy *et al.*, 2012).

Negative feelings like anxiety, loneliness, despair, and even hostility frequently coexist with addiction. People who are battling addiction or alcoholism frequently abuse substances to numb the bad emotions they experience. They must use more as withdrawal progresses because their feelings become worse, and they need to feel normal.

People frequently have more trouble controlling their emotions during the entire course of drinking and addiction, not just during withdrawal. The basic mechanics of addiction, cravings, and impulsivity are connected to brain changes that only get worse as the addiction progresses (George, 2015).

Addicts may experience more intense emotions of melancholy, worry, worthlessness, and fury. Existing mental health issues, such as anxiety, might get worse if addiction is active. By using the same neural pathways that support addiction, the identical processes that support drug usage in parts of the brain like the amygdala can also support anxiety issues (Murphy *et al.*, 2012).

Different drugs have varying effects on the brain and emotions. Chronic cocaine withdrawal that is sudden or provoked (Markou and Koob, 1991), amphetamine (Paterson *et al.*, 2000), opioids (Schultheis *et al.*, 1994), cannabinoids (Gardner and Vorel, 1998), nicotine (Epping-Jordan *et al.*, 1998), and ethanol (Schultheis *et al.*, 1995) leads to higher reward thresholds during acute abstinence, some of which can lead to long-term addiction last for as long as a week (Koob, 2009).

Different emotional changes are brought on by prescription medications, such as opiates. For instance, opiates are a class of pharmaceutical medicines that can cause pronounced emotional shifts. The blood flow between the two hemispheres of the brain was observed to change with long-term opiate use, with one hemisphere receiving somewhat more blood than the other. These blood flow abnormalities brought on by opiate misuse are connected to more depressive moods in patients who have higher blood flow in the right hemisphere of the brain (Pezawas *et al.*, 2002).

Alexithymia is a complex concept with emotional and cognitive elements. These elements include difficulties with emotion recognition and expression, the inability to distinguish between bodily sensations and emotions, a lack of fantasy, and an externally

oriented cognitive style.

Taken together, these traits reveal a deficit in the cognitive processing of emotions. Increased drug use in teenagers is also associated with difficulties in identifying and expressing emotions, and among young substance abusers, alexithymia prevalence is reported to vary from 30 to 43.9 percent in those aged 15 to 24 - observed at higher levels than in the general population (Parolin *et al.*, 2017).



Figure 2: Diagrammatic Model for representing effects and controlling of drug addiction.

1.7 Cure of drug addiction by medicinal plants

Medicinal plants are one of promising source to reverse the drug addiction abuse effects because the medicinal plants are effective have no side effects. Several medicinal plants are reported to overcome the drug addiction effects for instance a medicinal plant Pinax (Ginsang) was reported to improve behavioral effects, caused by drug addiction through alcohol, morphine, cocaine addiction in clinical trial (Takahashi and Tokuyama, 1998). Pinax based treatment has also reported to detoxify the harmful effects of alcohol in body and lowering drug concentration at plasma level (Tabatbai *et al.*, 2014). Pinax plant use also improved the mental health of addicted patients by enhancing expression of tyrosine hydroxylase and *cFos* gene expression in brain (Wang *et al.*, 2021). African plant Tabermanthe iboga produced ibogaine which produced long term resistant effect against addiction of different drugs for instance cocaine, morphine, heroine, furthermore Ibogaine (Raslan, 2022) (compound obtained from medicinal plant) is frequently applied in modern treatment centers of drug addicts in modern countries like USA, Germany, Europe and Mexico (Mendes and Prado, 2016). *Hypericum perforatum* has its antidepressant properties well known since previous times its consumption by smokers caused them

to quit smoking in 37% (Thirty seven percent) of participants in a previous report (Jaffal and Abazid, 2022). *Corydalis yanhusuo* a Chinese medicinal herb is being consumed in treatment of patients addicted with heroin and cocaine recovering effects in China (Zhu *et al.*, 2020). This medicinal plant produced bioactive levo-tetrahydropalmatine (l-THP) alkaloid which is being used in clinics now in modern therapy to recover against drugs addiction furthermore this is approved institute of drug by Chinese government against drugs abuse (Tian *et al.*, 2020). A Thailand localized medicinal plant *Emilia sonchifolia* is popular to help patients in quitting of smoking (Thongkhao *et al.*, 2020).

Conclusions and Recommendations

Drug addiction and scourge of drug trafficking is common in almost every part of the world. People of every class, age and gender are addicted to drugs. geographical location is very important for the transportation of drugs in different parts of world. Drug addiction is responsible for millions of deaths of drug addicts in the world every year. People abuse to drugs due to various family problems, unemployment, and isolation, failure in love and easy access to drugs and may be to overcome their depression and disappointment, and as a resultant, family society and ultimately country is affected due to changes in one's neurological and emotional system. So physical and mental health of drug addict is affected. It causes poor educational performance, job problems, financial crisis, psychiatric and personality disorders, family disharmony and social crimes like domestic violence. Psychological problems may include; stress or depression, schizophrenia or bipolar disorder, anxiety problems and attention-deficit hyperactivity disorder (ADHD). People may face feelings of sadness, isolation, anxiety, anger and worthlessness. Prevention from drug abuse depends on different factors. Long term planning and different supportive factors are required to reduce the rate of drug addiction. Basic public policy and support of local community may be effective to eliminate drug abuse. Medicinal plants also play a role in recovering from adverse effects of drug addiction in modern era.

Novelty Statement

Drug addiction has impacts on health and caused unbearable mental as well as emotional pain. Drug

addiction is responsible for millions of deaths of drug addicts in the world every year. People abuse to drugs due to various family problems, unemployment, and isolation, failure in love and easy access to drugs and ultimately country is affected due to changes in one's neurological and emotional system.

Author's Contribution

Dr.Samiya Rehman supervised the other authors to write manuscript, added headings, tables, correct the references and also remove grammatically mistakes.

Miss Eman Mustafa added some headings and also correct the article according to reviews comments.

Mr. Ali Ahmad Faiz added some headings to the manuscript.

Miss Maheen Knawal added some headings and add diagram to manuscript.

Dr.Farkhanda Yasmin proof-read the article.

Miss Arooj Fatima added some headings to manuscript.

Conflict of interest

The authors have declared no conflict of interest.

References

- Abdul, M., and Farhana, S., 2011. Origin and development of drug addiction in South Asia with special reference to Pakistan. *Pakistan Journal of Commerce and Social Sciences*, 5(1).
- Abuse among the Patients of Two Hospitals in Bangladesh. *Journal of Addiction Research and Therapy*, 8.
- Abuse, N.I.O.D., 2018. The science of drug use and addiction: The basics. In: *Addiction in Bangladesh and its Effect. Medicine Today*, 25(2): 84-89. <https://doi.org/10.3329/medtoday.v25i2.17927>
- Adnan, G., Abid, H., and Nahid, N., 2018. Alarming signals of drug addiction among the Southern youths in Bangladesh: A survey based research. *International Journal of Clinical and Biomedical Research*, pp. 17-22. <https://doi.org/10.31878/ijcbr.2018.44.04>
- Ahad, M., Chowdhury, M., Islam, M., and Alam, M., 2017. Socioeconomic Status of Young Drug Addicts in Sylhet City, Bangladesh. *IOSR Journal of Humanities and Social Science*, 22: 84-91. <https://doi.org/10.9790/0837-2206028491>
- Ahad, M., Chowdhury, M., Kundu, D., Tanny,

- N., and Rahman, W., 2017. Causes of Drug Addiction among Youth in Sylhet City of Bangladesh. *IOSR Journal of Humanities and Social Science*, 22: 27-31. <https://doi.org/10.9790/0837-2205072731>
- Ahammed, F., and Srabon, S., 2019. The impact of drug addiction among the students of tertiary level in Bangladesh. *Journal of Education and Practice*, 10: 17.
- Akanbi, M.O., Carroll, A.J., Achenbach, C., O'Dwyer, L.C., Jordan, N., Hitsman, B., and Murphy, R., 2019. The efficacy of smoking cessation interventions in low- and middle-income countries: A systematic review and meta-analysis. *Addiction*, 114(4): 620-635. <https://doi.org/10.1111/add.14518>
- Alamgir, A., 2017. Drugs: Their natural, synthetic, and biosynthetic sources. In: *Therapeutic use of medicinal plants and their extracts*. Springer, 1: 105-123. https://doi.org/10.1007/978-3-319-63862-1_4
- Alhassen, L., Nuseir, K., Ha, A., Phan, W., Marmouzi, I., Shah, S., and Civelli, O., 2021. The extract of *Corydalis yanhusuo* prevents morphine tolerance and dependence. *Pharmaceuticals*, 14(10): 1034. <https://doi.org/10.3390/ph14101034>
- Aljubori, N., 2020. The biological and psychological impacts of drug addiction: A review: Drug addiction. *International Journal of Medical Sciences*, 3(2): 4-11. <https://doi.org/10.32441/aajms.3.2.2>
- An, C., Shi, Y., Li, P., Hu, X., Gan, Y., Stetler, R. A., Leak, R.K., Gao, Y., Sun, B.L., Zheng, P. and Chen, J. 2014. Molecular dialogs between the ischemic brain and the peripheral immune system: dualistic roles in injury and repair. *Progress in neurobiology*, 115, 6-24
- Asare, S., Stoklosa, M., Drope, J., and Larsen, A., 2019. Effects of prices on youth cigarette smoking and tobacco use initiation in Ghana and Nigeria. *Int. J. Environ. Res. Public Health*, 16(17). <https://doi.org/10.3390/ijerph16173114>
- Asensio, S., Romero, M.J., Palau, C., Sanchez, A., Senabre, I., Morales, J.L., and Romero, F.J., 2010. Altered neural response of the appetitive emotional system in cocaine addiction: An fMRI Study. *Addict Biol.*, 15(4): 504-516. <https://doi.org/10.1111/j.1369-1600.2010.00230.x>
- Azofeifa, A., Mattson, M.E., Schauer, G., McAfee, T., Grant, A., and Lyerla, R., 2016. National estimates of marijuana use and related indicators. *National survey on drug use and health, United States, 2002-2014. Morbidity and Mortality Weekly Report: Surveillance Summaries*, 65(11): 1-25. <https://doi.org/10.15585/mmwr.ss6511a1>
- Becker, J.B., and Hu, M., 2008. Sex differences in drug abuse. *Front Neuroendocrinol.*, 29(1): 36-47. <https://doi.org/10.1016/j.yfrne.2007.07.003>
- Becker, J.B., and Koob, G.F., 2016. Sex differences in animal models: focus on addiction. *Pharmacological reviews*, 68(2): 242-263. <https://doi.org/10.1124/pr.115.011163>
- Cannon, M., Arseneault, L., Poulton, R., Murray, R. M., Caspi, A., and Moffitt, T.E., 2003. Cannabis use in adolescence and risk for adult psychosis: A birth cohort study. *Schizophrenia Research*, 60(1): 35-35. [https://doi.org/10.1016/S0920-9964\(03\)80102-0](https://doi.org/10.1016/S0920-9964(03)80102-0)
- Carreiro, H. 2011. Kawasaki disease in a young infant: diagnostic challenges. *Acta reumatologica portuguesa*, 304-308.
- Chinet, L., Bolognini, M., Plancherel, B., Stéphan, P., and Halfon, O., 1998. Is alexithymia a typical characteristic of addictive behaviours in adolescents and young adults? *Swiss Journal of Psychology/Schweizerische Zeitschrift für Psychologie/Revue Suisse de Psychologie*.
- Crews, F.T., Zou, J., and Qin, L., 2011. Induction of innate immune genes in brain create the neurobiology of addiction. *Brain Behav Immun*, 25(Suppl 1): S4-s12. <https://doi.org/10.1016/j.bbi.2011.03.003>
- David Browne, 2014. *How Pakistan succumbed to a hard-drug epidemic*.
- Doherty, D.T., Moran, R., and Kartalova-O'Doherty, Y., 2008. Psychological distress, mental health problems and use of health services in Ireland.
- Dubé, K.C., and Handa, S.K., 1971. Drug use in health and mental illness in an Indian population. *Br. J. Psychiatry*, 118(544): 345-346. <https://doi.org/10.1192/bjp.118.544.345>
- Eashwar, V.M.A., Gopalakrishnan, S., Umadevi, R., and Geetha, A., 2019. Pattern of alcohol consumption and its associated morbidity among alcohol consumers in an urban area of Tamil Nadu. *J. Family Med. Prime Care*, 8(6): 2029-2035. https://doi.org/10.4103/jfmpc.jfmpc_226_19
- Ekekedgwa, R., 2016. Social and psychological

- determinants of drug abuse by young people in Nigeria. *Philosophy Psychology Pedagogy*, 16: 459-465. <https://doi.org/10.18500/1819-7671-2016-16-4-459-465>
- Epping-Jordan, M.P., Watkins, S.S., Koob, G.F., and Markou, A., 1998. Dramatic decreases in brain reward function during nicotine withdrawal. *Nature*, 393(6680): 76-79. <https://doi.org/10.1038/30001>
- Fergusson, D.M., Lynskey, M.T., and Horwood, L.J., 1996. The short-term consequences of early onset cannabis use. *J. Abnorm. Child Psychol.*, 24(4): 499-512. <https://doi.org/10.1007/BF01441571>
- Flora, K., and Stalikas, A., 2012. Factors affecting substance abuse treatment in Greece and their course during therapy. *Addict. Behav.*, 37(12): 1358-1364. <https://doi.org/10.1016/j.addbeh.2012.07.003>
- Gardner, E.L., and Vorel, S.R., 1998. Cannabinoid transmission and reward-related events. *Neurobiol. Dis.*, 5(6 Pt B): 502-533. <https://doi.org/10.1006/nbdi.1998.0219>
- George, T.P. 2015. A review of co-morbid tobacco and cannabis use disorders: Possible mechanisms to explain high rates of co-use. *The American journal on addictions*, 24(2), 105-116.
- Giarratano, P., Ford, J.D., and Nochajski, T.H., 2020. Gender differences in complex posttraumatic stress symptoms, and their relationship to mental health and substance abuse outcomes in incarcerated adults. *Journal of Interpersonal Violence*, 35(5-6): 1133-1157. <https://doi.org/10.1177/0886260517692995>
- Glantz, M., and Hartel, C., 1999. Drug abuse: Origins and interventions. *American Journal of Psychiatry*, 159. <https://doi.org/10.1037/10341-000>
- Gordon, A.J., Conley, J.W., and Gordon, J.M., 2013. Medical consequences of marijuana use: A review of current literature. *Current Psychiatry Reports*, 15(12): 1-11. <https://doi.org/10.1007/s11920-013-0419-7>
- Guerri, C., and Pascual, M., 2019. Impact of neuroimmune activation induced by alcohol or drug abuse on adolescent brain development. *International Journal of Developmental Neuroscience*, 77: 89-98. <https://doi.org/10.1016/j.ijdevneu.2018.11.006>
- Hall, W., and Solowij, N., 2006. The adverse health and psychological consequences of cannabis dependence. *Cannabis dependence: Its nature, consequences and treatment*, pp. 106-128. <https://doi.org/10.1017/CBO9780511544248.007>
- Hossain, P.M., 2020. Socio-economic, cultural and family factors causing juvenile delinquency and its consequences in Bangladesh: A look for way out. *Asian Journal of Social Sciences and Management Studies*, 7: 89-98. <https://doi.org/10.20448/journal.500.2020.72.89.98>
- Hossain, P.M., 2021. Socio-cultural, psychological and family aspects of drug addiction of adolescents and its impact: An analysis from Bangladesh perspective. *Journal of Advanced Research in Social Sciences and Humanities*, pp. 6. <https://doi.org/10.26500/JARSSH-06-2021-0101>
- Islam, R.N., Tabassum, N.E., Shafiuzzaman, A., Umar, B.U., and Khanam, M., 2013. Methamphetamine (YABA) Abuse: A case study in young male. *Faridpur Medical College Journal*, 7(2): 102-104. <https://doi.org/10.3329/fmcj.v7i2.13527>
- Jaffal, S., and Abazid, H., 2022. Medicinal plants and addiction treatment: An overview. *Handbook of Substance Misuse and Addictions: From Biology to Public Health*, pp. 1-26. https://doi.org/10.1007/978-3-030-67928-6_21-1
- Jiloha, 2009. *Social and cultural aspects of drug use in adolescents*.
- Karrari, P., Mehrpour, O., Afshari, R., and Keyler, D., 2013. Pattern of illicit drug use in patients referred to addiction treatment centres in Birjand, Eastern Iran. *J. Pak. Med. Assoc.*, 63(6): 711-716.
- Kazmers, N.H., Stephens, A.R., and Tyser, A.R., 2019. Effects of baseline opioid medication use on patient-reported functional and psychological impairment among hand clinic patients. *The Journal of Hand Surgery*, 44(10): 829-839. <https://doi.org/10.1016/j.jhsa.2019.07.003>
- Kehinde, F., Oduyeye, O., and Mohammed, R., 2019. Could the link between drug addiction in adulthood and substance use in adolescence result from a blurring of the boundaries between incentive and hedonic processes? *Subst Abuse Rehabil.*, 10: 33-46. <https://doi.org/10.2147/SAR.S202996>
- Khan, S., 2020. *Abuse drug addictives beginning and causes of drug among different gender in district Charsadda Pakistan*. <https://doi.org/10.24966/>

ADSD-9594/100023

- Khattak, M.A., Iqbal, N., Khattak, S.R., and Ullah, I., 2012. Influence of drugs on student performance: A qualitative study in Pakistan university students. *Interdis J. Contem. Res. Bus.*, 4(8): 826-838.
- Killgore, W.D., and Yurgelun-Todd, D.A., 2007. Neural correlates of emotional intelligence in adolescent children. *Cognitive Affective and Behavioral Neuroscience*, 7(2): 140-151. <https://doi.org/10.3758/CABN.7.2.140>
- Koob, G.F., 2009. Neurobiological substrates for the dark side of compulsivity in addiction. *Neuropharmacology*, 56(Suppl 1): 18-31. <https://doi.org/10.1016/j.neuropharm.2008.07.043>
- Koob, G.F., 2015. The dark side of emotion: the addiction perspective. *European Journal of Pharmacology*, 753: 73-87. <https://doi.org/10.1016/j.ejphar.2014.11.044>
- Lasser, K., Boyd, J.W., Woolhandler, S., Himmelstein, D.U., McCormick, D., and Bor, D.H., 2000. Smoking and mental illness: A population-based prevalence study. *Journal of the American Medical Association*, 284(20): 2606-2610. <https://doi.org/10.1001/jama.284.20.2606>
- Li, M.D., and Burmeister, M., 2009. New insights into the genetics of addiction. *Nat. Rev. Genet.*, 10(4): 225-231. <https://doi.org/10.1038/nrg2536>
- Lipari, R.N., Hedden, S.L., and Hughes, A., 2014. Substance use and mental health estimates from the 2013 National survey on drug use and health: Overview of findings. *The CBHSQ Report*.
- Markou, A., and Koob, G.F., 1991. Postcocaine anhedonia. An animal model of cocaine withdrawal. *Neuropsychopharmacology*, 4(1): 17-26.
- Masood, S., and Us-Sahar, N., 2014. Exploratory research on the role of family in youth's drug addiction. *Health Psychology and Behavioral Medicine: An Open Access Journal*, 2(1): 820-832. <https://doi.org/10.1080/21642850.2014.939088>
- McHugh, R.K., Votaw, V.R., Sugarman, D.E., and Greenfield, S.F., 2018. Sex and gender differences in substance use disorders. *Clinical psychology review*, 66: 12-23. <https://doi.org/10.1016/j.cpr.2017.10.012>
- Mendes, F.R., and Prado, D.D.R., 2016. Use of herbal medicine to treat drug addiction. In: *Innovations in the Treatment of Substance Addiction*. Springer, Cham. pp. 51-68. https://doi.org/10.1007/978-3-319-43172-7_4
- Miteva, R., Abrashev, H., and Nikolova, G., Illicit Substances on Dopamine Receptors and Brain. pp. 155-165. Retrieved from <http://hdl.handle.net/10419/188021>
- Mohiuddin, A.K., 2019. Drug addiction in Bangladesh: A consequence of social demoralization rather than individual flaws. *ARC Journal of Addiction*. 4: 19-26. <https://doi.org/10.28933/ijart-2019-11-1005>
- Montesinos, J., Pascual, M., Pla, A., Maldonado, C., Rodríguez-Arias, M., Miñarro, J., and Guerri, C., 2015. TLR4 elimination prevents synaptic and myelin alterations and long-term cognitive dysfunctions in adolescent mice with intermittent ethanol treatment. *Brain Behavior and Immunity*, 45: 233-244. <https://doi.org/10.1016/j.bbi.2014.11.015>
- Murphy, A., Taylor, E., and Elliott, R., 2012. The detrimental effects of emotional process dysregulation on decision-making in substance dependence. *Frontiers in Integrative Neuroscience*, 6: 101. <https://doi.org/10.3389/fnint.2012.00101>
- Naqshbandi, M.M., 2012. *Drug addiction and youth of Kashmir*.
- National Academies of Sciences, and E Medicine. 2019a. *Medications for opioid use disorder save lives*. Washington, DC: The National Academies Press.
- National Academies of Sciences, and E Medicine. 2019b. *Pain management for people with serious illness in the context of the opioid use disorder epidemic: proceedings of a workshop*. Washington, DC: The National Academies Press.
- Parolin, M., Simonelli, A., Cristofalo, P., Sacco, M., Bacciardi, S., Maremmanni, A. G Maremmanni, S., Cimino, C., Trumello and Cerniglia, L., 2017. Drug addiction and emotional dysregulation in young adults. *Heroin Addiction and Related Clinical Problems*, 19(3), 37-48.
- Paterson, N. E., Myers, C., and Markou, A., 2000. Effects of repeated withdrawal from continuous amphetamine administration on brain reward function in rats. *Psychopharmacology (Berl.)*, 152(4): 440-446. <https://doi.org/10.1007/s002130000559>
- Pathak, D.C., and Pokharel, B., 2018. *Causes of drug abuse in youth: Case of Mid-Western Region of*

- Nepal. <https://doi.org/10.3126/jaar.v4i2.19534>
- Patoari, M.M.H. 2021. Socio-cultural, psychological and family aspects of drug addiction of adolescents and its impact: An analysis from Bangladesh perspective. *Journal of Advanced Research in Social Sciences and Humanities*, 6(1), 01-14
- Pezawas, L., Fischer, G., Podreka, I., Schindler, S., Brücke, T., Jagsch, R Thurnher, M., and Kasper, S., 2002. Opioid addiction changes cerebral blood flow symmetry. *Neuropsychobiology*, 45(2): 67-73. <https://doi.org/10.1159/000048679>
- Hossain, M.F. and Mamun, M. 2006. "A Critical Analysis of Drug Addiction in Urban Life of Bangladesh". *The Social Sciences*. 1(1): 60-64.
- Possi, M.K., 1996. *Effects of drug abuse on cognitive and social behaviors*.
- Qasim, M., 2015. Addiction continues to be on the rise among Pakistani youth. *International The News*.
- Rabbi, A.R., 2019. *43% of unemployed population addicted to drugs*. Retrieved from
- Vetreno, R.P., Lawrimore, C.J., Rowsey, P.J., and Crews, F.T., 2018. Persistent adult neuroimmune activation and loss of hippocampal neurogenesis following adolescent ethanol exposure: Blockade by exercise and the anti-inflammatory drug indomethacin. *Front. Neurosci.*, 12: 200. <https://doi.org/10.3389/fnins.2018.00200>
- Rahaman, M., 2014. Drug trafficking in South Asia: A case study on Bangladesh. *Asian Journal of Multidisciplinary Studies*, 2(9).
- Raslan, M., 2022. Natural products for the treatment of drug addiction: A narrative review. *Chemistry and Biodiversity*. <https://doi.org/10.1002/cbdv.202200702>
- Rezvi, M.R., 2019. Influencing factors of 'Yaba' addiction among the youth of Bangladesh and its effect: A qualitative study. *Asian Research Journal of Arts and Social Sciences*. <https://doi.org/10.9734/arjass/2019/v9i330127>
- Roth, G.A., Abate, D., Abate, K.H., Abay, S.M., Abbafati, C., Abbasi, N., and Murray, C.J.L., 2018. Global, regional, and national age sex specific mortality for 282 causes of death in 195 countries and territories, 1980-2017: A systematic analysis for the global burden of disease study 2017. *The Lancet*, 392(10159): 1736-1788.
- Sajid, M., 2020. Causes of drug abuse among University Students in Pakistan: Variation by gender and drug type. *Pakistan Social Sciences Review*, 4: 459-468. [https://doi.org/10.35484/pssr.2020\(4-I\)36](https://doi.org/10.35484/pssr.2020(4-I)36)
- Schulteis, G., Markou, A., Cole, M., and Koob, G.F., 1995. Decreased brain reward produced by ethanol withdrawal. *Proc. Natl. Acad. Sci. U.S.A.*, 92(13): 5880-5884. <https://doi.org/10.1073/pnas.92.13.5880>
- Schulteis, G., Markou, A., Gold, L.H., Stinus, L., and Koob, G.F., 1994. Relative sensitivity to naloxone of multiple indices of opiate withdrawal: A quantitative dose-response analysis. *J. Pharmacol. Exp. Ther.*, 271(3): 1391-1398.
- Shadman, A., 2017. *Drug Abuse Is Out of Control at Pakistani Schools and Universities*.
- Shazzad, M., Abdal, S., Majumder, M., Sohel, J., Ali, S., and Ahmed, S., 2014. Drug addiction in Bangladesh and its Effect. *Medicine Today*, 25. <https://doi.org/10.3329/medtoday.v25i2.17927>
- Shazzad, N., Abdal, S.J., Majumder, M.S.M., Sohel, J.U.A., Ali, S.M.M., and Ahmed, S., 2014. Drug addiction in Bangladesh and its effect. *Medicine Today*, 25: 84-89. <https://doi.org/10.3329/medtoday.v25i2.17927>
- Siddike, P., Soron, T., Ahmed, H., and Chowdhury, C., 2017. Social and family determinants of substance abuse among the patients of two hospitals in Bangladesh. *Journal of Addiction Research and Therapy*, 8(4): 1-4.
- Singh, J., and Gupta, P., 2017. Drug addiction: Current trends and management. *The International Journal of Indian Psychology*, 5: 2348-5396. <https://doi.org/10.25215/0501.057>
- Slavova, S., Delcher, C., Buchanich, J.M., Bunn, T.L., Goldberger, B.A., and Costich, J.F., 2019. Methodological complexities in quantifying rates of fatal opioid-related overdose. *Curr. Epidemiol. Rep.*, 6(2): 263-274. <https://doi.org/10.1007/s40471-019-00201-9>
- Spear, L.P., 2016. Consequences of adolescent use of alcohol and other drugs: Studies using rodent models. *Neuroscience and Biobehavioral Reviews*, 70: 228-243. <https://doi.org/10.1016/j.neubiorev.2016.07.026>
- Substance, A., Mental Health Services, A., and Office of the Surgeon, G., 2016. Reports of the surgeon general. In: *Facing Addiction in America: The Surgeon General's Report on Alcohol, Drugs, and Health*. Washington (DC): US Department of Health and Human Services.
- Tabatabai, S.M., Dashti, S., Doosti, F., and

- Hosseinzadeh, H., 2014. Phytotherapy of opioid dependence and withdrawal syndrome: A review. *Phytotherapy research*, 28(6): 811-830. <https://doi.org/10.1002/ptr.5073>
- Takahashi, M., and Tokuyama, S., 1998. Pharmacological and physiological effects of ginseng on actions induced by opioids and psychostimulants. *Methods and Findings in Experimental and Clinical Pharmacology*, 20: 77-84. <https://doi.org/10.1358/mf.1998.20.1.485635>
- Thomas, B.E., Thiruvengadam, K.S.R., Kadam, D., Ovung, S., Sivakumar, S., and Gupta, A., 2019. Correction: Smoking, alcohol use disorder and tuberculosis treatment outcomes: A dual comorbidity burden that cannot be ignored. *PLoS One*, 14(11): e0224914. <https://doi.org/10.1371/journal.pone.0224914>
- Thongkhao, K., Pongkittiphan, V., Phadungcharoen, T., Tungphatthong, C., Urumarudappa, S.K.J., Pengsuparp, T., and Sukrong, S., 2020. Differentiation of *Cyanthillium cinereum*, a smoking cessation herb, from its adulterant *Emilia sonchifolia* using macroscopic and microscopic examination, HPTLC profiles and DNA barcodes. *Scientific reports*, 10(1): 1-11. <https://doi.org/10.1038/s41598-020-71702-7>
- Tian, B., Tian, M., and Huang, S.M., 2020. Advances in phytochemical and modern pharmacological research of *Rhizoma Corydalis*. *Pharmaceutical Biology*, 58(1): 265-275. <https://doi.org/10.1080/13880209.2020.1741651>
- Tullis, F.L., and Institut de recherche des Nations Unies pour le développement social, 1991. Handbook of Research on the Illicit Drug Traffic: Socioeconomic and political consequences. New York: Greenwood.
- United Nations. World Drug Report 1, Executive summary. United Nations publication, Sales No. E.19.XI.8. 2019a. https://wdr.unodc.org/wdr2019/prelaunch/WDR19_Booklet_1_EXECUTIVE_SUMMARY.pdf
- Volkow, N. D., and Montaner, J. 2010. Enhanced HIV testing, treatment, and support for HIV-infected substance users. *JAMA*, 303(14), 1423-1424. <https://doi.org/10.1002/9780470479216.corpsy0585>
- Volkow, N.D., Chang, L., Wang, G.J., Fowler, J.S., Ding, Y.S., Sedler, M., and Hitzemann, R., 2001. Low level of brain dopamine D2 receptors in methamphetamine abusers: Association with metabolism in the orbitofrontal cortex. *American Journal of Psychiatry*, 158(12): 2015-2021. <https://doi.org/10.1176/appi.ajp.158.12.2015>
- Volkow, N.D., Koob, G.F., and McLellan, A.T., 2022. Neurobiologic advances from the brain disease model of addiction. *Evaluating the Brain Disease Model of Addiction*, pp. 25-34. <https://doi.org/10.4324/9781003032762-5>
- Volkow, N. D., Koob, G. F., and McLellan, A. T. 2016. Neurobiologic advances from the brain disease model of addiction. *New England Journal of Medicine*, 374(4), 363-371.
- Wang, D., Hu, G., Wang, J., Yan, D., Wang, M., Yang, L., Serikuly, E., Alpyshev, K.A., Demin, D.G., Tamara, G., Amstislavskay, M., Abreu and Kalueff, A.V., 2021. Studying CNS effects of Traditional Chinese Medicine using zebrafish models. *Journal of Ethnopharmacology*, 267: 113383. <https://doi.org/10.1016/j.jep.2020.113383>
- Wani, M., 2016. Impact of drug addiction on mental health. *Journal of Mental Disorders and Treatment*, 2: 2-3. <https://doi.org/10.4172/2471-271X.1000110>
- Wani, M.A., and Sankar, R., 2016. Impact of drug addiction on mental health. *Journal of Mental Disorder and Treatment*, 2(1): 1-3. <https://doi.org/10.4172/2471-271X.1000110>
- Warner, L.A., Kessler, R.C., Hughes, M., Anthony, J.C., and Nelson, C.B., 1995. Prevalence and correlates of drug use and dependence in the United States. Results from the National Comorbidity Survey. *Arch. Gen. Psychiatry*, 52(3): 219-229. <https://doi.org/10.1001/archpsyc.1995.03950150051010>
- Weiser, M., Reichenberg, A., Grotto, I., Yasvitzky, R., Rabinowitz, J., Lubin, G., and Davidson, M., 2004. Higher rates of cigarette smoking in male adolescents before the onset of schizophrenia: A historical-prospective cohort study. *American Journal of Psychiatry*, 161(7): 1219-1223. <https://doi.org/10.1176/appi.ajp.161.7.1219>
- Weller, R.A., and Halikas, J.A., 1985. Marijuana use and psychiatric illness: A follow-up study. *Am. J. Psychiatry*, 142(7): 848-850. <https://doi.org/10.1176/ajp.142.7.848>
- World Drug Report. 2020. <https://www.unodc.org/unodc/press/releases/2020/June/media-advisory%2D%2D-global-launch-of-the-2020-world-drug-report.html>
- Zaman, M., Razaq, S., Hassan, R., Qureshi, J., Ijaz,

- H., Hanif, M., and Chughtai, F.R., 2015. Drug abuse among the students. *Pakistan Journal of Pharmaceutical Research*, 1(1): 41-47. <https://doi.org/10.22200/pjpr.2015141-47>
- Zhu, W., Zhang, Y., Huang, Y., and Lu, L., 2017. Chinese herbal medicine for the treatment of drug addiction. *International Review of Neurobiology*, 135: 279-295. <https://doi.org/10.1016/bs.irm.2017.02.013>