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Review Article

Heroin as Substance of Addiction

Dr. Anil Batta*
Head, Department of Medical Biochemistry, Govt. Medical College, Amritsar, Punjab, India

***Corresponding author:** Dr. Anil Batta
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Abstract

Although each drug causes unique physiological and neurological effects, all drugs overlap in one important way, All drugs cause changes in the brain, some in ways that may be long-lasting or even permanent. These brain changes can have significant effects on mood and cause depression, ultimately lessening a person's ability to lead their best and healthiest life. Your brain regulates all the body's basic functions, including every breath and each heartbeat, while enabling you to interpret and respond to experience. It shapes thoughts and emotions and determines your behavior. Despite some commonality, the short- and long-term health effects of drugs are distinct, with each one potentially affecting life spans in a different way. Opioids include heroin and prescription pain relievers such as oxycodone, hydrocodone, codeine, morphine and fentanyl. All members of the same chemical family, these drugs interact with the opioid receptors on nerve cells in both the body and the brain. Out of everyone who tries heroin for the first time, nearly one in four become addicted. Repeated heroin use changes the physical structure Wang, X et al., (2012) and physiology of the brain, creating long-term imbalances in neuronal and hormonal systems that are not easily reversed Ignar, D. M et al., (1990) & Kreek, M. J et al., (1984). Studies have shown some deterioration of the brain's white matter due to heroin use, which may affect decision-making abilities, the ability to regulate behavior, and responses to stressful situations Li, W et al., (2013), Qiu, Y et al., (2013) & Liu, J et al., (2011). Heroin also produces profound degrees of tolerance and physical dependence. Tolerance occurs when more and more of the drug is required to achieve the same effects.

Keywords: neurological effects, physiological, drugs, Opioids, heroin.

INTRODUCTION

Heroin and opioids

Heroin is a highly addictive painkiller synthesized from morphine, which comes from the seeds of the poppy plant. Because poppy plants are used to make opium, any drugs derived from them are considered opiates. Both heroin and morphine are opiates. Heroin is also known by names like junk, smack or "H." Street heroin is often combined with dangerous additives like morphine or the powerful pain reliever fentanyl. Approximately four million Americans have tried heroin at least once in their lifetime. Symptoms of prolonged heroin use can include severe itchiness, depression and collapsed veins. Not all heroin looks the same. It comes in several different forms and can be abused in several different ways, including snorting, smoking and injecting. The incidence of heroin initiation was 19 times higher among those who reported prior nonmedical pain reliever use than among those who did not (0.39 vs. 0.02 percent) [1]. A study of young, urban injection drug users interviewed in 2008 and 2009 found that 86 percent had used opioid pain relievers nonmedically prior to using heroin, and their initiation into nonmedical use was characterized by three main sources of opioids: family, friends, or personal prescriptions [2]. This rate represents a shift from historical trends. Of people entering treatment for heroin addiction who began abusing opioids in the 1960s, more than 80 percent started with heroin. Of those who began abusing opioids in the 2000s, 75 percent reported that their first opioid was a prescription drug [3]. Examining national-level general population heroin data (including those in and not in treatment), nearly 80 percent of heroin users reported using prescription opioids prior to heroin [4, 1]. While prescription opioid abuse is a growing risk factor for starting heroin use, only a small fraction of people who abuse pain relievers switch to heroin use. According to general population data from the National Survey on Drug Use and Health, less than 4 percent of people who had abused prescription opioids started using heroin within 5 years [1]. This suggests that prescription opioid abuse is just one factor in the pathway to heroin. Furthermore, analyses suggest that those who transition to heroin use tend to be frequent users of multiple substances (polydrug users) [5]. Additional analyses are needed to better characterize the

population that abuses prescription opioids who transition to heroin use, including demographic criteria, what other drugs they use, and whether or not they are injection drug users.

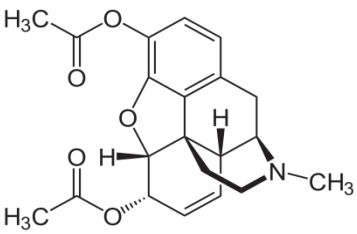
OBSERVATIONS

With physical dependence, the body adapts to the presence of the drug, and withdrawal symptoms occur if use is reduced abruptly. Withdrawal may occur within a few hours after the last time the drug is taken. Symptoms of withdrawal include restlessness, muscle and bone pain, insomnia, diarrhea, vomiting, cold flashes with goose bumps ("cold turkey"), and leg movements. Major withdrawal symptoms peak between 24–48 hours after the last dose of heroin and subside after about a week. However, some people have shown persistent withdrawal signs for many months.

Finally, repeated heroin use often results in heroin use disorder—a chronic relapsing disease that goes beyond physical dependence and is characterized by uncontrollable drug-seeking, no matter the consequences [6]. Heroin is extremely addictive no matter how it is administered, although routes of administration that allow it to reach the brain the fastest (i.e., injection and smoking) increase the risk of developing heroin use disorder. Once a person has heroin use disorder, seeking and using the drug becomes their primary purpose in life.

Once heroin enters the brain, it is converted to morphine and binds rapidly to opioid receptors [7]. People who use heroin typically report feeling a surge of pleasurable sensation—a "rush." The intensity of the rush is a function of how much drug is taken and how rapidly the drug enters the brain and binds to the opioid receptors. With heroin, the rush is usually accompanied by a warm flushing of the skin, dry mouth, and a heavy feeling in the extremities. Nausea, vomiting, and severe itching may also occur. After the initial effects, users usually will be drowsy for several hours; mental function is clouded; heart function slows; and breathing is also severely slowed, sometimes enough to be life-threatening. Slowed breathing can also lead to coma and permanent brain damage [8]. Repeated heroin use changes the physical structure [9] and physiology of the brain, creating long-term imbalances in neuronal and hormonal systems that are not easily reversed [10, 11]. Studies have shown some deterioration of the brain's white matter due to heroin use, which may affect decision-making abilities, the ability to regulate behavior, and responses to stressful situations [12-14].

Heroin also produces profound degrees of tolerance and physical dependence. Tolerance occurs when more and more of the drug is required to achieve the same effects. With physical dependence, the body adapts to the presence of the drug, and withdrawal symptoms occur if use is reduced abruptly. Withdrawal may occur within a few hours after the last time the drug is taken. Symptoms of withdrawal include restlessness, muscle and bone pain, insomnia, diarrhea, vomiting, cold flashes with goose bumps ("cold turkey"), and leg movements. Major withdrawal symptoms peak between 24–48 hours after the last dose of heroin and subside after about a week. However, some people have shown persistent withdrawal signs for many months. Finally, repeated heroin use often results in heroin use disorder—a chronic relapsing disease that goes beyond physical dependence and is characterized by uncontrollable drug-seeking, no matter the consequences [6]. Heroin is extremely addictive no matter how it is administered, although routes of administration that allow it to reach the brain the fastest (i.e., injection and smoking) increase the risk of developing heroin use disorder. Once a person has heroin use disorder, seeking and using the drug becomes their primary purpose in life.



Heroin structure

Why HIV/hepatitis and hepatitis

Heroin use increases the risk of being exposed to HIV, viral hepatitis, and other infectious agents through contact with infected blood or body fluids (e.g., semen, saliva) that results from the sharing of syringes and injection paraphernalia that have been used by infected individuals or through unprotected sexual contact with an infected person. Snorting or smoking does not eliminate the risk of infectious disease like hepatitis and HIV/AIDS because people under the

influence of drugs still engage in risky sexual and other behaviors that can expose them to these diseases. People who inject drugs (PWIDs) are the highest-risk group for acquiring hepatitis C (HCV) infection and continue to drive the escalating HCV epidemic: Each PWID infected with HCV is likely to infect 20 other people [15]. Of the 30,500 new HCV infections occurring in the United States in 2014, most cases occurred among PWID [16]. Hepatitis B (HBV) infection in PWIDs was reported to be as high as 25 percent in the United States in 2014 [16], which is particularly disheartening since an effective vaccine that protects against HBV infection is available. There is currently no vaccine available to protect against HCV infection. Drug use, viral hepatitis and other infectious diseases, mental illnesses, social dysfunctions, and stigma are often co-occurring conditions that affect one another, creating more complex health challenges that require comprehensive treatment plans tailored to meet all of a patient's needs.

DISCUSSION

Heroin and prescription opioid pain relievers both belong to the opioid class of drugs and their euphoric effects are produced by their binding with mu opioid receptors in the brain. Different opioid drugs have different effects that are determined by the way they are taken and by the timing and duration of their activity at mu opioid receptors. People who began using heroin in the 1960s were predominantly young men from minority groups living in urban areas (82.8 percent; mean age at first opioid use, 16.5 years) whose first opioid of abuse was heroin (80 percent). The epidemic of prescription opioid abuse has been associated with a shifting of the demographic of opioid users toward a population that is somewhat older (mean age at first opioid use, 22.9 years), less minority, more rural/suburban, with few gender differences among those who were introduced to opioids through prescription drugs. Whites and nonwhites were equally represented in those initiating use prior to the 1980s, but nearly 90 percent of respondents who began use in the last decade were white [3]. Because heroin is often injected, the upsurge in use also has implications for HIV, hepatitis C (HCV), and other injection-related illnesses. Recent studies suggest that having used opioid pain relievers before transitioning to heroin injection is a common trajectory for young injection drug users with HCV infection [17]. A study of new HCV infections in Massachusetts found that 95 percent of interview respondents used prescription opioids before initiating heroin [18].

Possible treatment

A variety of effective treatments are available for heroin use disorder, including both behavioral and pharmacological (medications). Both approaches help to restore a degree of normalcy to brain function and behavior, resulting in increased employment rates and lower risk of HIV and other diseases and criminal behavior. Although behavioral and pharmacologic treatments can be extremely useful when utilized alone, research shows that for many people, integrating both types of treatments is the most effective approach.

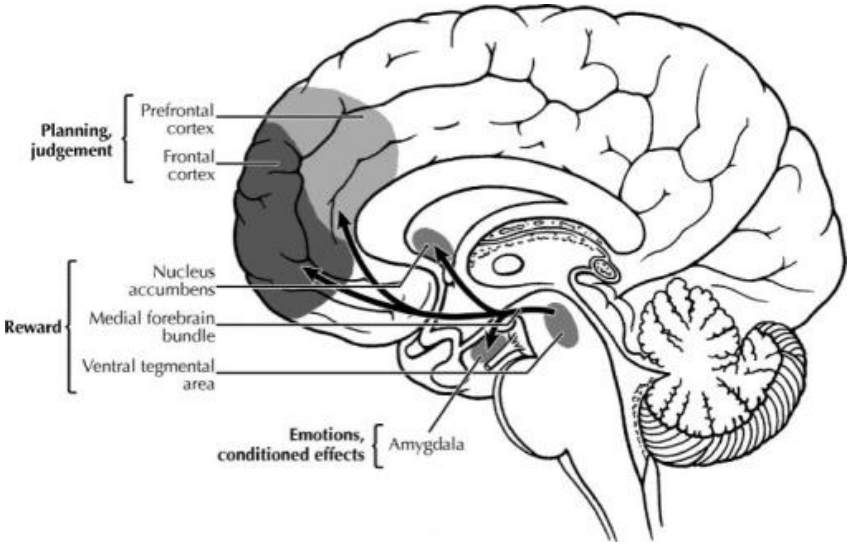


Fig-1: Schematic Diagram of the Human Brain That Highlights Some of the Main Brain Areas and Neurotransmitter Pathways Implicated In Reward Processes

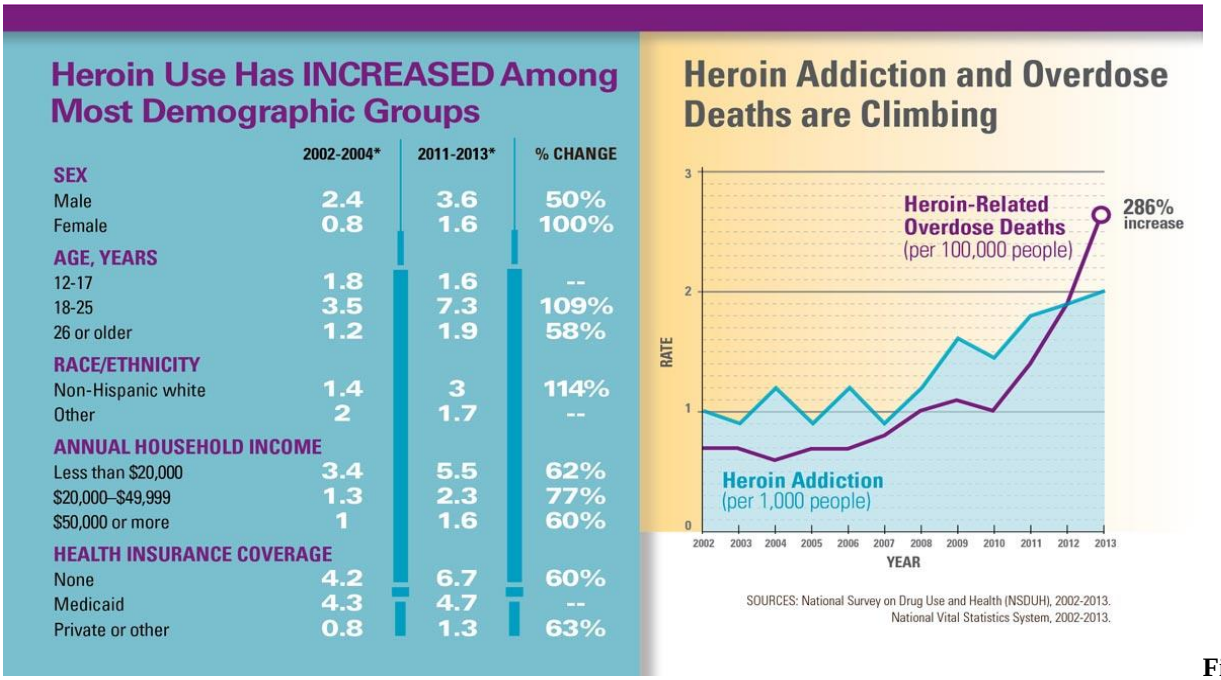


Fig-2:

Incresing Incidencce of Heroin Addiction

Overdose

Overdose is a dangerous and deadly consequence of heroin use. A large dose of heroin depresses heart rate and breathing to such an extent that a user cannot survive without medical help. Naloxone (e.g., Narcan®) is an opioid receptor antagonist medication that can eliminate all signs of opioid intoxication to reverse an opioid overdose. It works by rapidly binding to opioid receptors, preventing heroin from activating them [19]. Because of the huge increase in overdose deaths from prescription opioid misuse, there has been greater demand for opioid overdose prevention services. Naloxone that can be used by nonmedical personnel has been shown to be cost-effective and save lives [20].

Naloxone can quickly restore normal breathing and save the life of a person who is overdosing on opioids

In 2015, over 33,000 people died from an overdose on opioid drugs, including prescription pain relievers, heroin, and fentanyl [21]. Naloxone is a safe medication that is widely used by emergency medical personnel and other first responders to prevent opioid overdose deaths. Unfortunately, by the time a person having an overdose is reached, it is often too late. Naloxone is an opioid receptor antagonist meaning it binds to opioid receptors and reverses or blocks the effects of other opioids. Giving naloxone immediately reverses the effects of opioid drugs, restoring normal respiration. It can be administered by injection or through a nasal spray. Administering naloxone in cases of opioid overdose can cause withdrawal symptoms when the person is dependent on opioids; this is uncomfortable without being life threatening [22, 23]. The risk that someone overdosing on opioids will have a serious adverse reaction to naloxone is far less than their risk of dying from overdose [24]. Naloxone only works if a person has opioids in their system; the medication has no effect if opioids are absent.

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