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Heroin Drug: Production, Chemistry, Effects and Analysis

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Abstract:

Heroin production is on rise. This study aims to introduce Heroin production, its chemistry, and its effects on the human body. In this context, we study how the manufacture of heroin is done with the help of various chemicals, how we can analyze the heroin from a given sample with the help of different reagents. Based on a different review of literature on heroin recovery, comparative analysis of heroin, characteristics of heroin, etc. we demonstrated that there is a possibility to recover a heroin addict naturally, and there are many techniques to study the characteristics of heroin. The conclusion indicates that heroin production is not so expensive, and this factor is responsible for abrupt increases in the marketing of heroin.

Heroin is an illegal drug, which is known by many names such as black sugar, horse, smack, junk, skat, and harry. It is a class 'A' drug. It is an opioid drug with strong addictive properties. There are three types of heroin i.e. white, brown, and black tar. Heroin is diluted with quinine, lactose, mannitol, etc. Heroin with the combination of cocaine is called "speedballs". It is rapidly hydrolyzed in the stomach therefore it is not taken orally. It is the most dangerous among all drugs. Heroin is a depressant with analgesic/ painkilling properties. Heroin is a narcotic drug and its abuse increases rapidly.

Keywords: *Heroin, Opium, Morphine, Alkaloids, Extraction.*

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Introduction

Heroin was always being widespread in sense of drug addiction and several media coverage. As we know the whole world is in panic situation and lockdown occur all over the world due to COVID-19, the distribution of heroin is being restricted, which heroin trafficking people are taking advantage of by selling heroin in double prices. So many questions related to this come to mind, such as where does it come from? Where does it made up of? What is it looking like? Heroin comes under opioid family. It was first manufactured in 1898 by the Bayer pharmaceutical company of Germany and marketed for the treatment for tuberculosis and for morphine addiction treatment. The main source of heroin is opium poppy plant which grows in temperate, low humidity and warm areas. Types of soil requires to grow poppy plants are clay and sandy. The major legal areas for growing opium poppy plants in the world are India, Turkey, Australia, and Tasmania while the illegal areas are Burma, Thailand, China, Vietnam, Pakistan, Mexico, Afghanistan, Colombia, Iran, Lebanon, and Laos.

Heroin production starts with the farmers who cultivate *Papaver Somniferum* L. (opium poppy) seeds, in August and September, at the end of the rainy season. The seeds may vary in colors; they may be yellow, white, gray, blue, or black. A seed color does not define the flower colors. After a month, when opium poppy attains a height of one foot, some of the plants are removed to allow the other plant to grow more and this process is known as thinning. Around after 3 to 4 months poppies flowers fully bloom. If the pod's crowns are standing or are in an upwardly curved position, then it's mean we can score the pod. If the pod's crown is downward then it is not yet matured. With the help of a blade, cut the green pods of the poppy flowers to release milky latex, which is the source of raw opium (this process is called scoring). About one millimeter depth is best for the incision because if the cuts are too superficial, then the flow of latex will be too sluggish that the opium will solidify on the pods while if the cuts are too deep then the flow of latex will be too rapidly and will drop to the ground **(Negrusz and Jickells, 49)**.

The scoring of the pods (also called lancing, incising, or tapping) begins in the late afternoon so that the milky latex can exude and slowly solidify on the surface of pod overnight. If the scoring begins early in the afternoon, the Sun will cause the milky latex to solidify over the cut and block the flow. This milky latex dries overnight and turns into a sticky black gum. Now this gum is collected and bulked as raw opium. Now the raw opium is boiled and removed all impurities. The clear brown color liquid is called "liquid opium". This liquid is reheated until the water evaporates and residue remains is a thick paste. This paste is known as "prepared opium", cooked opium", or "smoking opium"

Cooked opium has more than 35 alkaloids in it. Before converting the morphine to heroin we have to extract the morphine from the opium. Extraction of morphine from opium is done in clandestine laboratories. In the process of extraction of morphine, we dissolved opium in hot water, adding lime to precipitate of non-morphine alkaloids, and in last, to precipitate morphine from the solution we added ammonium chloride in it. Now, these morphine blocks are then packed and transferred to heroin laboratories. Heroin manufacture process from morphine is a two-step process. Firstly, we added acetic anhydride which reacts with morphine to form diacetylmorphine (impure heroin). Secondly, activated charcoal is added and the mixture is then filtered to remove colored impurities. The heroin base is now dried, packed, and transported to heroin refining laboratories or it may be purified or converted to heroin hydrochloride. **(https://www.ncjrs.gov/pdf)**

Heroin is morphine derived alkaloid therefore it is morphine bearing two acetyl substituents on the O-3 and O-6. It has the molecular formula: $C_{12}H_{23}NO_5$ and molecular weight of 369.4g/mol. **(https://pubchem.ncbi.nlm.nih.gov)**

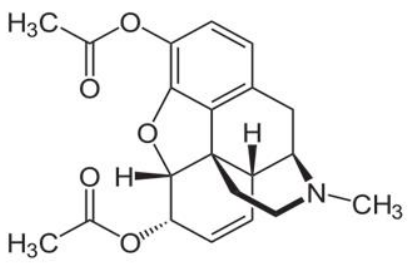

Figure No. 1: Structure of Heroin

The effects of heroin are similar to morphine. Heroin is act as an analgesic and painkilling properties. It causes more dizziness than morphine. Effects of heroin are tremors, twitching, mental confusion, and dilation of the pupils, dry mouth, hallucination, and sometimes convulsions. Other effects are impaired, clouded mental functioning, nausea, and vomiting slowed breathing, addiction, physical dependence; heart lining and valves infection, kidney and liver

failure, unchanged damage to vital organs. Overdose of heroin can lead to death of the users **(Reddy, 588)**.

The color tests are an only presumptive test of the possible presence of heroin or other opiate alkaloids. Many other materials and uncontrolled drugs may give similar colors with the test reagents. It is necessary to confirm results by the use of an alternative technique.

1. **Marquis Test –** Marquis Reagent is a simple presumptive spot- test to identify alkaloids or other compounds. Marquis reagent is a mixture of formaldehyde and concentrated sulfuric acid. Marquis reagent is dropped onto the sample being tested. Different color reactions are shown on different compounds. To slow down the reaction process and for better observation of color change, we may add methanol. Methanol will slow down the polymerization process. Marquis test is the key presumptive test used for heroin.

Process: This test is done by scraping off a small amount of the sample and adding a drop of the marquis reagent (clear and colorless). The results are interpreted by seeing the color of the resulting mixture and by time used for the change in color. Purple-violet color is observed.

Mechanism: Marquis Reagent is a mixture compound of formaldehyde and concentrated sulfuric acid and is used to alkaloid substances (alkaloids is a natural substance containing basic nitrogen atoms). While the mechanism is still not completely understood, it is presently believed that the test succeeds due to the presence of a stable carbocation.

2. **Mecke's Test:** The Mecke's reagent is a simple presumptive spot- test to identify alkaloids or other compounds. Mecke's reagent is a mixture of Selenous acid and concentrated Sulfuric acid. Marquis reagent is dropped onto the sample being tested.

Process: The reagents are slowly dripped onto the test material which has been placed on a spotting tile. The amount of test material should not exceed and no more than 3 drops of test reagent should be needed. The deep green color is observed.

Mechanism: Meckes reagent contains sulfuric acid, which breaks down bonds in functional groups of tested chemicals and re-arranges them with Selenious acid. The color was caused by a reduction of Selenious ion.

3. **Frohde's Reagent:** The Frohde's reagent is a simple presumptive spot-test to identify alkaloids, (especially opioids), or other compounds. It is a compound mixture of molybdic acid or a molybdate salt dissolved in hot and concentrated sulfuric acid. Frohde's reagent is then dropped onto the samples being tested. Unheated sulfuric acid can be used to prepare the reagent in a less dangerous manner, but 2-4 hours must be allowed for the molybdate to dissolve.

Process: The reagents are slowly dripped onto the test material which has been placed on a spotting tile. The amount of test material should not exceed and no more than 3 drops of test reagent should be needed. Purple becoming grey-purple color is observed.

Mechanism: It was difficult to predict the results of heroin with froehde's reagent since this reaction is not established. It was proposed that most alkaloids tested had a functional group possibly able to react and yield a color with molybdate ion from frohde's reagent. The color was caused by a reduction of molybdate ion **(Tewari, 107)**.

Review of Literature

Waldorf and Biernacki (1979): They have looked at the phenomena of the natural recovery of drug abusers from heroin addiction. They used natural in the sense that without the help of any treatment some abusers succeed to stop taking heroin and not become re-dependent.

Craig (1979): He studied personality differences between different addict groups, changes throughout the addiction cycle, and their further treatments. His studies are based on MMPI. Some personality features of heroin addicts have been frequently demonstrated experimentally, but it is unbearable to decide whether these traits are part of the addictive personality and predated drug use, or whether they are the consequence of drug addiction. In this area, most research has been proceeded to build models and generate hypotheses on heroin addiction.

Sawynok (1986): He studied that currently heroin is being prescribed as a first-rate therapeutic drug for use in end-stage diseases. However, until now all the review of the literature on heroin presently available does not support his content.

MD (1997): He determined whether the cocaine and heroin samples have a common origin with the help of occluded solvent analysis process. In his study, they used headspace sampling, gas chromatographic, mass spectrometry with various columns, nuclear magnetic resonance spectrometry, or other detectors. In their study they successfully determined (a) to identify which solvents have been used in the production of a particular batch; (b) the relationship between different drug samples; and (c) quantitatively analysis the distribution of solvent**.**

Chiarotti and Fucci (1999): Studied the analytical techniques which are used for the relative analysis of cocaine and heroin cases. The depiction of illicit samples is done using a various techniques such as thin-layer chromatography, gas chromatography, high-performance liquid chromatography, and capillary electrophoresis. With the help of these techniques, it is easy to resolve some components in illicit drugs. In their review, they also described the application for relative analyses of some components of illicit drugs.

Tucker and Ritter (2000): They studied the mechanism of naltrexone in the human body that is addicted to heroin drugs. Naltrexone is an opioid antagonist, who bind antagonistic at the opioid receptors and obstruct the effects of exogenous opioids. Naltrexone has been used to promote withdrawal. This research-based on the efficacy of rapid withdrawal to date is very restricted.

Shanahan *et al.* (2006): They studied various detoxification methods used for heroin. They also analysis heroin with a cost-effective method. The methods used by them are in NEPOD "Australian National Evaluation of Pharmacotherapy for Opioid Dependence".

Degenhardt *et al.* (2010): They studied the different mortality rate of different drug users such as regular or dependent. They studied according to particular causes and related to several population variables. They studied with the help of many experts, techniques, data, and many agencies.

Discussion

Heroin drugs and its importance are analyzed by reviewing numerous papers on it. Waldorf and Biernacki (1979) worked on natural recovery from heroin addiction, and in his work, he recovered heroin drug-addicted person naturally without any medicinal treatment.

On the basis of the paper of **Degenhardt *et al.* (2010)**, there is a higher mortality rate in non-treatment drug-addicted patients than treated patients. Causes of death are varied all over the world but overdose was the commonest cause.

Heroin is a very addictive drug due to its fast-acting property. Heroin can pass the blood-brain barrier very quickly which makes it addictive. There are many health issues regarding heroin such as miscarriage, death from overdose, heart infection, etc. regular use of heroin can make it tolerance. Tolerance means users need more amount of drug to have the same effect. Taking higher doses repeatedly can make the body dependent on heroin. Now, at that stage, if dependent users stop heroin, they start to show withdrawal symptoms. These symptoms vary from person to person.

With the increased use of heroin, more people are experiencing negative health effects. Solid heroin dissolved in liquid and then injected into the body. Another method of taking heroin is by heated it on a silver foil and smoke or inhaled the vapor.

It can be injected or can be heated on silver foil and smoke or inhaled or used as snuff. Symptoms appear in 3 to 4 hours and reach maximum intensity 8 to 12 hours later. Then they decline rapidly and disappear in 4 to 5 days. The examination of a heroin sample in a criminal case, the primary thing is to identify the diacetylmorphine. The examiner also identified various adulterants, diluents, and impurities that are present in the sample, which give useful information to enforcement authorities.

Conclusions

In the present study, it has been reviewed, and conclusively stated that heroin production is not so expensive the chemicals used in heroin production are readily available and are inexpensive. Simultaneously, the laboratory equipment which is used to synthesis heroin is very basic, easily available, and easy to handle. These factors are responsible for abruptly increases in the marketing of heroin. Heroin is a highly potent drug. Heroin used disorders and their dependency also increased in numerous urban areas among young adults.

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